

Appendices

Case Study Details

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APPENDICES FOR:

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***Strategies for Increasing Prescribed Fire Application
on Federal Lands: Lessons from Case Studies in the U.S. West***



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Appendix A: The San Juan National Forest

Background

The San Juan National Forest (hereinafter, the SJNF or the Forest) encompasses around 1.8 million acres of high-desert mesas and alpine peaks in southwestern Colorado. The Forest has experienced high levels of wildfire in recent years, including the 20,000-acre Plateau Fire and the 54,000-acre 416 fires in 2018, which both ranked in the ten highest-acreage wildfires ever recorded in the state of Colorado. Key informants in Colorado suggested that the SJNF would be a good case study given its increasing prescribed fire accomplishments, perceived productive relationships with the State of Colorado's Air Pollution Control Division, and potential for cooperative work across both Forest Service and BLM lands.

According to conversations with fuels program staff, the SJNF's integrated fuels target is around 20,000 acres/year, which is accomplished through both thinning and burning. In fiscal year (FY) 2018, the SJNF accomplished a little over 1,100 acres of broadcast and pile burning; burning was limited in this year due to extreme drought and high wildland fire activity. In FY 2019, the SJNF accomplished 510 acres of pile burning and 11,849 acres

of broadcast burning. Because the fiscal year ends on September 30th, 2019 numbers included burns that were completed in Fall 2018, when we collected our data in-person. For FY 2020, the SJNF had broadcast burned 9,345 acres in late fall 2019, but as of April 2020, the Region had put a hold on any additional prescribed fire due to concerns related to COVID-19. The SJNF's annual budget for fuels reduction is around \$3,000,000, which, according to multiple interviewees, includes some increased investment from the Regional Office based on the Forest's efforts and success in building their fuels program over the last several years.

The Forest has three ranger districts (Columbine, Pagosa, and Dolores), each with distinct forest conditions, topographies, social and economic contexts, and management strategies. All three districts are working to increase their use of prescribed burning. The Columbine Ranger District has used prescribed fire regularly for 15 years and has a goal of reaching a consistent burn program of 5,000 to 25,000 burn acres per year; over the last two years they have been successful at accomplishing multi-thousand-acre burns near the wildland-urban interface (WUI) during August and September. The Pagosa District includes many

homes in the WUI near high fuel loads and with limited egress; it is also closest to the continental divide which acts as a “catcher’s mitt” for smoke, according to interviewees, making prescribed burning more challenging. The Pagosa and Dolores Ranger Districts both began increasing their use of prescribed fire around five years ago, according to interviewees. At the time of our research the Dolores District had just completed a district-wide NEPA document for prescribed fire; the Dolores District also partnered with the BLM’s Tres Rios District to accomplish burning.

The three districts are taking different approaches to planning and implementing fuels treatments. For example, at the time of our interviews, the Columbine Ranger District was using an integrated vegetation management approach with multiple, larger environmental assessments (EAs) and the Dolores Ranger District had just completed a landscape-level prescribed fire EA. The Forest has also undertaken some other forest-wide planning strategies specifically around fire management, such as developing a quantitative risk assessment and starting the process of designating Potential Operational Delineations (PODs). Their 2013 Forest Plan envisions a role for fire, under appropriate conditions, across about 90% of the Forest, according to interviewees.

Primary challenges and barriers

The main challenges identified by interviewees were: narrow burn windows, concerns about having personnel with sufficient or appropriate training and qualifications, leadership risk aversion, and various disincentives, including timber targets and lack of hazard pay for prescribed burning.

Interviewees emphasized that they have an insufficient workforce to plan and conduct prescribed burning. Most interviewees described how the Forest Service and partners have to “*scrap together resources*” from adjacent ranger districts and partners to implement projects. In particular, most interviewees cited the following limiting factors related to workforce: a lack of fuels staff members

with time dedicated to prescribed fire, and being understaffed both in summer when demand for workforce is high and in winter when employees are laid off. Several interviewees talked about their desire to have a well-staffed “fuels organization” (i.e., a fuels program leader at the Supervisor’s Office and fuels planners on each district) on a forest like the SJNF, where fuels reduction is a priority, to make sure work gets planned and that a minimum level of capacity for both planning and implementation is available.

Interviewees also talked about challenges of being chronically understaffed and having high personnel turnover. They explained that being understaffed can mean that individual employees may be responsible for so many tasks that they are unable to dedicate necessary attention to any of them. This can lead to staff burnout and turnover, which results in frequent vacancies and considerable staff time dedicated to training new employees rather than accomplishing restoration tasks.

Interviewees said that burning across boundaries is administratively and socially complicated and requires more capacity than is often available on the SJNF. A few interviewees said administrative processes for sharing funding, staffing, and other resources are costly and time-consuming. These interviewees suggested it would be helpful in the future to develop a single resource-ordering system for prescribed burning, as well as easier ways to coordinate, partner, and enter into agreements with other jurisdictions, landowners, local fire departments, and agencies. A few interviewees noted that conflicting land use priorities or administrative policies among different agencies can also inhibit ability to work across jurisdictions.

A few interviewees explained that administrative separation of wildfire suppression and prescribed fire resources makes it difficult to coordinate fire resources on a district or to access prescribed fire resources during wildland fire season. As one person put it, “*We don’t have so much policy barriers here; we have organizational barriers.... I still feel that we have a dichotomous wildland fire management organization.*”

Interviewees said that agency leadership needs to more consistently prioritize resources for non-suppression activities on the SJNF. Most interviewees cited the comparative lack of resources allocated for prescribed burning and other restoration activities compared to wildfire suppression. One said, *“The mentality is that fire suppression will always take over precedence of doing any kind of fuels work, whether it’s prescribed fire or mechanical work.”* Another interviewee explained, *“We don’t prioritize ecosystem restoration. We say we do, but our actions speak differently.”* Many noted that when the nation was in preparedness levels (PL) 4 or 5, Regional Office leadership could be unwilling to prioritize resources for a prescribed fire. Some noted that they sometimes have burns planned, but then cannot accomplish them because all resources are deployed to wildland fires, even when those wildfires may not require all the resources allocated to them. This dynamic is particularly challenging on the SJNF, when the best burn windows are in August and September, which is also the height of fire season. Some noted that, at the least, suppression crews could be utilized better when they are on-call during fire season. In general, interviewees thought that there needed to be a more strategic and intentional distribution of resources to address agency priorities:

“I think there probably needs to be a bigger, broader discussion at the national level about what truly... are the priorities. Because on the one hand we’re saying, ‘Well, we definitely need to get out in front of this and burn more, and reintroduce fire on the landscape and manage more fires, do more prescribed burning.’ And everybody nods their heads in agreement.... And then when we hit PL4 and PL5, and it’s time to start burning of some of these forests, we can’t get the resources because they’re tied up fighting fire elsewhere.... Every time you use PL4, PL5 as an excuse not to do prescribed burning, you’ve punted it down the road so then the next generation has to deal with that, or so the next drought is going to give you a catastrophic wildfire in the areas that you were planning on doing prescribed burning, and so your communities are less safe.”

With regard to air quality, while most interviewees described the permitting process as becoming increasingly flexible and unrestrictive, they also said some challenges remain. Some interviewees mentioned the comparative difficulty of getting permits in WUI areas, across larger landscapes, where there are mixed land ownerships, or when there are other non-standard permitting conditions. They also mentioned the need for increased flexibility in the timing of burns, given that the most favorable meteorological conditions for burning are often in the evening, which is typically outside of the allowable burn window.

According to a few interviews, some recent policy changes were creating constraints. A couple interviewees cited the 2016 Prescribed Fire Approval Act as adding administrative requirements. Several people said the relatively inflexible protections for Gunnison Sage-Grouse limit burning in their habitat even when fire could be beneficial for habitat quality.



Facilitators and successful strategies for prescribed burning

Interviewees on the SJNF pointed to four primary variables that were allowing them to increase their prescribed fire accomplishments, including:

- Strong leadership at all levels, which supported increased engagement in partnerships, communication, and planning;
- Robust partnerships to support their program; this has resulted in numerous agreements for resource sharing and active partnerships to support communication with the public;
- Proactive communication efforts about smoke and fire with the public and with other agencies, including local fire and state air quality agencies; and
- Strategic and flexible planning strategies, from a revised Forest Plan, to district-wide NEPA documents, to burn plan flexibility.

Leadership

Nearly all interviewees spoke about the outsized influence of proactive forest- and district-level leaders and staff members, particularly fire management officers, fuels program leaders, and line officers, on whether prescribed fire is actually implemented. Interviewees discussed the importance of line officer support for prescribed fire and the important role of leadership from program leaders at the Forest and District levels.

People emphasized that leadership and personal commitment are critical given the many potential barriers to doing prescribed fire. Two interviewees explained the importance of this, saying:

“Really what I’ve found with especially prescribed burning is it’s too easy to make an excuse.... [By contrast], I use our Columbine Ranger District as an example, they had the 416 Fire on their district this year.... You talk about a district that’s focused in on prescribed burning and getting things done? In a D4 drought in PL4, PL5 with extremely limited resources, they still pull off the largest landscape

burning in the region. It’s really about the individuals better leading that effort, so I think that’s probably the biggest takeaway I have is hire good people that are motivated around prescribed fire.”

“The San Juan typically to me they’re kind of one of our more forward-thinking forests. And I think a large part of... that’s personality driven. If you’ve got the right person with the right skill set and the right vision, they can have that huge impact on a program.”

Some interviewees also noted that strong line officer and program leader support for prescribed fire had led to more partnership and resource-sharing agreements and overall capacity. In the BLM, leaders had used fuels program dollars and set direction to make the BLM Unawep Fire Module available for prescribed fire and to make fuels work the Module’s priority. Line and staff officers on the SJNF had actively pursued partnerships to find adequate capacity for burning and had signaled to staff members the importance of working in an integrated fashion and dedicating staff time to prescribed fire:

“[We have] people in other resource areas that have fire qualifications, and having them available to assist us with prescribed fire adds that little extra bit of horsepower that we really need.... So having the support, or the direction, from the [Supervisor’s Office], from the Rangers saying, ‘Hey, when we get an opportunity, you’re going to drop everything and come help us,’ that [is] great.”

Interviewees described a positive-feedback loop between forest-level leadership and extra support from the Regional Office. Interviewees explained that the Forest is getting extra resources in part because they have demonstrated that they will put them to good use and use them to leverage additional resources. This leads the Regional Office to provide even more resources in a positive feedback loop. One interviewee explained:

“We get a lot of support from the Region, if they can send resources our way they will.... We receive it because they know... when they put the money on this forest we’re going to get it done.”

Partnerships and communication

Partnerships and communication strategies were brought up repeatedly by interviewees as a key means to reduce potential constraints and increase capacity. Interviewees discussed partnerships with air quality regulators, local non-profit organizations, and other land management and fire agencies to accomplish more burning. On the Dolores District, interviewees discussed the value of the partnership between the BLM Tres Rios District and the Forest Service. They also noted the value of the BLM Unawep Fire Module's availability to do fuels work, including prescribed fire. They emphasized that efforts to proactively communicate with different entities and members of surrounding communities were central to their success.

Staff members on the SJNF explained that they have taken extra steps to engage air quality regulators; they also noted that air quality regulation is something they have to consider but that it is not a primary constraint on their program. Interviewees said that the SJNF actively reaches out to regulators to understand concerns and political constraints, and to communicate about the Forest's plans to burn. Forest staff members have hosted Air Pollution Control Division (APCD) staff members and invested in communication with both the Regional Office smoke management liaison and regulators. The Forest has also engaged with a BLM meteorologist to improve monitoring and to develop better data about ventilation and smoke impacts to inform their dialogue with the APCD and the public. Interviewees also said that communication, especially about mistakes and smoke impacts, has built the necessary relationships and trust to support increased burning and issuing more flexible permits. Interviewees said:

“When something goes wrong, [SJNF staff members] are also right away willing to point this out to the state, and that helps.... [Say they] affected a neighborhood, for instance, that [they] didn't plan on impacting. They go ahead and they reach out to the air quality folks and that helps build trust....

Other forests... don't want to tell the state anything beyond what they absolutely have to. But the San Juan has been pretty transparent in what they've done, and that has helped build up the trust with the local air quality agency.”

“We are deploying smoke monitoring equipment on a whole host of our burns. We're being proactive, we're collecting the data, we're trying to do analysis. And so [the regulators] see that we're not just asking for stuff, we're also investing and trying to lead to better decision making and better outcomes. And so I think that's helped build that trust with the regulatory folks and us. I think there will always be room for improvement, and we'll always have issues that we'll want to bring to the table. But right now we've gone from an adversarial relationship to a productive one.”

Interviewees said that bringing in outside resources through federal and non-federal partnerships has helped address capacity as a major barrier to prescribed burning on the SJNF. This effort to identify and recruit additional resources has allowed the SJNF to partner extensively with local and national organizations, as well as adjacent federal and non-federal landowners and fire departments. Nearly all interviewees discussed how these partnerships increase the Forest's capacity for on-the-ground work, outreach, networking, and expertise:

“The Forest in general is always looking for opportunities where they can get partnerships, where they can bring in additional funding, where they can move resources around and help to implement.”

“Supervisor Office staff and the fire folks have worked really hard to put in place agreements and build relationships with a lot of their external partners.... The San Juan has the ability to reach out to their BLM partners, their state partners, the Nature Conservancy, the Conservation Corps and pull staff from those organization who have the skill-sets that are needed to help subsidize the Forest fast so that they can actually implement fire.”

Most interviewees also discussed how the Forest's partnerships are mutually beneficial. They explained that most organizations benefit from partnering with the SJNF through risk sharing, labor sharing, increased community support, and access to expertise, resources, and training. Another interviewee explained that the state was benefitting from the experience they can get while assisting federal burn crews. The State of Colorado largely stopped prescribed burning after an escape in 2012, and some of their staff members are trying to build up the agency's prescribed burning skills and experience. Interviewees said:

"We've been able to get the Forest Service and BLM crew, which is still a mixed crew here... to come out and help implement some pile burns [on private land]. And they come with their knowledge and they come with their drip torches and their equipment, and... they're helping to provide the workforce. And on the other side of that, we've connected them and brought other fire department volunteers in to work alongside them and join on Forest Service burns."

"[The state is] trying to rebuild their prescribed fire program.... And so them coming out and participating on our burns is really critical to their future success with prescribed fire implementation as well. Having these agreements has multiple benefits with our partners and to us."

Interviewees explained that the SJNF has built trust and social license with partners, regulators, and their public through proactive communication strategies. Nearly all interviewees thought that the Forest's external communications had improved greatly in recent years and credited this change with facilitating many of their successes. Communication activities included active outreach with the public, with air quality regulators, and with other organizations who specifically brought capacity to burn.

Interviewees said the SJNF is using partners and district-level staff members to actively engage members of the public who are concerned about or will be impacted directly by burning. This public

outreach has utilized a wide variety of tools and strategies, including: personal visits, social media, newspapers, radio, tours, and talks hosted by partner non-governmental organizations (NGOs) in the area. Some noted that the Forest has a strong presence in public forums and in the community. One interviewee said, *"They show up, and...that carries weight with it to the public."* Furthermore, the Forest has built trust by also making a point to be *"straight forward and honest. I don't think anybody is trying to sugar coat, and try to say, 'Smoke is awesome, we all love it.'"* While using a range of tools was seen as beneficial, it was the personal interactions that many interviewees felt were most effective. As one interviewee said, after listing a range of communication approaches, *"Our most successful [outreach is] when we actually talk to people one-on-one."* Interviewees described how the SJNF has therefore prioritized active outreach to members of the public who may be affected by prescribed burning but are not yet engaged in dialogue with the agency:

"We've engaged with as many people as we can in a non-bureaucratic setting, meaning coffee at a kitchen table with neighbors, extending outreach... to different neighborhoods saying, 'If any of you have any questions, call us. We will come out there and visit with you, and as many of your neighbors as you want to invite.' [We do this] instead of taking the approach of, 'Hey, we're having, or hosting a public meeting. You need to come to us.' We've kind of flipped that around, and there's been some folks that we had to really reach out to and say, 'We haven't heard from you. You're our neighbor. What do you think about this?' And we've really not left any stone unturned as far as our neighbors go... and then also engaging with people in the state, like the [Colorado Department of Public Health and Environment] and the smoke program, or the air quality program."

Strategic and flexible planning

Interviewees highlighted the value of the SJNF's Forest Plan's support of fire. A few interviewees explained that the Forest Plan's allowance of the

use of fire as a management tool on the majority of the SJNF provides a critical foundation for the Forest's ability to increase both management of natural ignitions for resource benefit and prescribed fire. Two interviewees explained the important facilitating role of the Forest Plan:

“Our Forest Plan is excellent... It supports and talks about the benefits of fire everywhere. From prescribed fire, to fire use, essentially. It supports all of that on almost 95% of the San Juan National Forest.”

“I think that we garner attention because we do manage wildfire, naturally ignited wildfire differently than almost every other forest in the Region because we had a land management plan that allows us to do it, because we have an operating plan that provides us the insight to be able to scale up so that we have the capability when we need it. And, then, we've gotten pretty good at it.”

The importance of flexible and efficient planning strategies was highlighted by interviewees, who discussed the advantages of different approaches being used by ranger districts. The Dolores District had just completed a district-wide environmental assessment (EA) for prescribed burning, while the Columbine District was using an integrative vegetation management approach to plan relatively large, multi-resource projects using EAs at a smaller scale than the district. Staff members saw advantages in both the Columbine and Dolores Districts' approaches. We also heard from one person about the value of flexible burn plans that allow burners to work under a wider array of conditions.

Almost all interviewees agreed that increasing the size of prescribed burn planning areas addressed in an EA could create efficiencies in time, cost, and workload for specialists. As one person explained, *“You need to be efficient. We know that you need to put fire down... in large areas or across the landscape. So we've definitely shifted our NEPA in the last three years to be a lot bigger and broader.”* Some interviewees discussed advantages of the Dolores District's district-wide EA approach,

which they said can create room for more logical prescribed fire boundaries, support decision making during wildland fires, and allow the District to count acres burned in prescription during naturally ignited fires towards accomplishments:

“[The district-wide EA] will open a lot of doors for them. Allow them to report a lot more acres towards risk mitigation, and it also supports [decision making] during a wildfire incident. It provides additional documentation and rationale on tactical decisions, and a management strategy in terms of whether we're going to manage this fire or aggressively suppress. That type of approach is providing them some additional opportunities moving forward... because the more projects you have on the books, the more opportunities you have when it comes to specific environmental windows or resource availability. It gives them the ability to react and to shift their resources around and take advantage of those opportunities as they open up.”

Some interviewees valued more site-specific planning and discussed perceived tradeoffs of the district-wide EA approach for prescribed fire. Tradeoffs included meeting the intent of NEPA, potentially missing opportunities to build partnerships, plan strategically about a sequence of actions, and identify planning solutions that address diverse stakeholders' interests and needs. Interviewees said:

“I think [district-wide NEPA] is good and bad. The good is that you do it once, you come up with a schedule of items for your specialist to get clearance in any given year, and it spreads the workload out over a longer period of time. From a cost perspective, from a workload, you know, [do] more with less, and all the other complaints we all have, it kind of balances that.... What it lacks is focus.... There's not strategy to it.... Whereas... site-specific [NEPA planning] actually gives you 'here's your control line, here's the burn unit, here's the return interval that you need.'”

“If you [do not have] site-specific NEPA, are you really meeting the intent of NEPA? Well, that's debatable. Right now the agency says yes, eight years ago

the agency said no. So that's why we do site-specific with all of our clearances. In order to claim those natural ignitions, it needs to be in an area where there's NEPA clearance, where there's an existing NEPA document. Some people have gone so far as to say, well, the Forest Plan is NEPA, let's do that... So it's like anything else, give us an inch, we will take a mile."

Some interviewees indicated that there were still opportunities to streamline clearance processes, even if NEPA documents were not constructed at the district- or forest-level. These opportunities generally focused on using partnerships:

"We entered into a programmatic agreement with [the State Historic Preservation Office] so that we would have [archaeological] clearances done prior to doing any sort of... construction of any fire line or things like that, but we weren't required to go out and physically clear or do [archaeological] surveys on 80,000 acres of our project area."

Summary

The SJNF has increased its prescribed burning with notable success over the last several years. As a result, the Regional Office has increased funding for the Forest's fuels program. The primary challenges the SJNF faced at the time of our research were insufficient workforce to plan and conduct burns, particularly during wildland fire season, which is when some of their best burn windows occur. Air quality permitting had become increasingly flexible as a result of active communication with regulators and increased outreach and monitoring; there was, however, still room for improvement. Interviewees attributed the Forest's success to: strong leadership from Fire Management Officers up to the line officers; active engagement in partnerships to support resource sharing and communication with the public; proactive communication with regulators and the public about smoke; and flexible planning, including a district-wide EA for prescribed fire and Forest Plan that anticipates the need for fire.





Appendix B: The BLM Socorro Field Office & Cibola National Forest

Background

This case study included Bureau of Land Management (BLM) and Forest Service lands in central New Mexico, focusing on the Socorro Field Office of the BLM and the Magdalena Ranger District on the Cibola National Forest (hereinafter, the CNF or the Forest). The Socorro Field Office is one of three field offices comprising the BLM's Albuquerque District (Socorro, Rio Puerco, and Amarillo Field Offices) and manages 1.5 million acres of surface and six million acres of subsurface public lands within Socorro and Catron counties in south-central and western New Mexico. The Magdalena Ranger District is the largest of four mountainous districts and four grasslands on the Cibola National Forest in central New Mexico. It is approximately 800,000 acres and consists of four non-contiguous parcels covering three counties (Socorro, Catron, and Sierra). We selected this case study because, in response to a broad call for participation that we sent through national-level BLM contacts, the Socorro Field Office self-identi-

fied as a unit working to increase their prescribed fire program and was the only BLM unit that volunteered to participate in our study. During Phase One of this research, we learned that there is unusually high coordination between Department of the Interior federal agencies, among National Forest units, and between state and federal land management agencies in this region. The Socorro Field Office, in particular, engages a broad network of state and federal partners to complete prescribed burning work, including a partnership with the Magdalena Ranger District on the Cibola National Forest. Three national forests in New Mexico (Cibola, Carson, and Santa Fe National Forests) have pooled their fuels and timber targets and resources in recent years in an attempt to increase their prescribed burning accomplishments. In addition, the state of New Mexico's legislature has funded mechanical thinning and prescribed burning work on federal lands in New Mexico for nearly 10 years. For these reasons we chose to conduct this as a joint Forest Service-BLM case study.

Interviewees indicated that the Albuquerque District's (hereinafter, the District) 2019 fiscal year (FY) prescribed fire target was 10,000 acres across the three field offices, and they burned 7,014 acres (plus an additional ~2,000 acres on the White Sands Missile Range that did not count toward the target). In other recent years, the District has both fallen short of and exceeded burning targets (e.g., in FY 2017 the target was 11,325 acres with 17,830 acres burned, whereas in FY 2016 225 of 5,500 target acres were burned). We were told that lower numbers tended to reflect periods when planned burn areas were not in prescription or when wildfire activity took precedence. The Albuquerque District's FY 2019 fuels program budget was \$656,500—an increase of \$250,000 from FY 2018. The District's fuels program budgets were reduced significantly between FY 2015 to FY 2018 due to the BLM's emphasis on funding Sage-Grouse habitat projects in other states.

The Magdalena Ranger District on the CNF has had an active fire program for more than 20 years and has significantly increased its overall use of fire over the past ~10 years. We were unable to obtain official details on the Forest's current fuels targets and budgets; however, interviewees told us that in FY 2018 the Magdalena Ranger District burned about 5,000 acres with prescribed fire.

Primary challenges and barriers

The main challenges cited by the Socorro Field Office and CNF included insufficient funding and lack of sufficient agency staff to support prescribed burning. In particular, interviewees noted the lack of resource specialists, contracts and agreements specialists, and dedicated fuels staff members. Many also explained that disincentives to burning exist within both agencies, and that, although both agencies have found informal ways to share resources and staff members with each other and other partners, there was a need to formalize resource-sharing agreements between the Forest Service and Department of Interior agencies including the BLM.

Interviewees described agencies as being increasingly understaffed and recounted a number of challenges due to lack of human capacity and, to a lesser extent, equipment constraints. Interviewees explained how limited budgets, human capacity, and equipment constraints (e.g., helicopters, helitorches) had caused agencies to decrease the size of projects, leave work in incomplete and sometimes dangerous states, or not pursue projects. Interviewees also explained that the CNF had attempted to find budget efficiencies by funding contracts in lieu of permanent staff members and centralizing many district staff members into one office. They told us that this strategy left significant capacity gaps at the CNF's district offices, in particular for resource specialists such as archeologists and biologists. A few interviewees further explained that BLM units with no Sage-Grouse habitat, such as the Socorro Field Office, have experienced sharp budget cuts as the BLM has prioritized funding nationally for units with Sage-Grouse habitat. Interviewees from both agencies discussed high turnover rates that were exacerbated in part due to an overly fatigued workforce, particularly among administrative staff members (e.g., grants and agreements). Some interviewees further said that the federal agencies did not have the capacity, and sometimes the training, to effectively handle outreach and communication needs around prescribed fires. Some interviewees explained that limited prescribed burning windows due to weather conditions and wind, were only limiting because they intersected with a lack of capacity. One interviewee said, *“When they say weather [is the barrier] what they really mean is... the really good weather is outside of our workforce's availability.”*

Nearly all interviewees said that agency priorities and incentive structures are a significant limitation to increasing prescribed burning for both the Socorro Field Office and Magdalena Ranger District. Diversion of resources from fuels treatments to wildfire suppression events drained much of both units' capacity for prescribed burning. One interviewee described it as, *“an annual event where we stand around looking at great burn windows and all of our firefighters are in California.”* Many interviewees also told us that existing

performance evaluation structures, pay differences between prescribed and wildland fire, and the prestige associated with fire suppression work. Interviewees thought some fire staff members would prefer to work prescribed fire rather than wildfires if given the option to stay on their home district (with or without hazard pay). They said that ultimately, however, the lack of incentives can lead to conservative decision-making by agency leadership and staff members about using fire as a tool to get ahead of the fuels loading problems:

“Since there’s no real incentive... to put fire on the ground, it’s easy to be like, ‘Oh, gosh, well, we have to wait for the absolute perfect day, because I don’t want my supervisor to get angry phone calls.’”

Most interviewees expressed an urgent need to develop and/or formalize resource-sharing agreements among federal agencies as well as with partners and contractors in central New Mexico. In particular, interviewees from the Socorro Field Office explained that they have active resource-sharing partnerships with other DOI agencies and the state of New Mexico, but that they lack formalized agreements for sharing resources with the Forest Service and Natural Resources Conservation Service. Interviewees explained that administrative processes were generally more difficult at the Forest Service than with other agencies, which was frustrating to partners trying to assist. Interviewees said it is difficult to develop resource-sharing agreements due to the administrative burden of producing the agreements but also because of the need to address the different goals, risk-tolerance levels, and administrative requirements for partners with different mandates.

Interviewees felt that in general, burn permits are inhibited more by threatened and endangered species regulations than by air quality concerns in central New Mexico. A few interviewees explained that efforts in managing Mexican Spotted Owl habitat in New Mexico have absorbed resources and restricted burning. They said that they must occasionally wait to implement a burn due to air quality concerns, but rarely is air quality the primary limiting factor for increasing burning.

Facilitators and successful strategies for prescribed burning

Interviewees identified several key strategies that had facilitated efforts to increase prescribed fire accomplishments. These included:

- Resource-sharing partnerships within and across federal, state, and private agencies in order to leverage funding and workforce;
- Training and incentives, including strong leadership support, from the agencies at all levels for increasing prescribed fire accomplishments;
- Outreach and communication, including utilizing a broad group of partners to communicate with the public; and
- Strategic planning that allows for careful consideration and adjustment to project size and scope depending on resource availability.

Interviewees from central New Mexico described several on-the-ground realities that facilitate prescribed fire overall. The region has a longer fire season than many areas (from February/March through October) and some amount of burning is possible in most months of the year. It also has low population density (and, therefore, fewer people impacted by smoke), and a landscape that *“lends itself to smoke dispersion”* which simplifies efforts to increase prescribed burning. Nearly all interviewees also told us there was high public awareness of and support for using fire for ecosystem management across New Mexico. One interviewee explained that, *“People kind of get [that prescribed fire is] about the only solution we’ve got in the toolbox that’s gonna meet our needs at a landscape scale.”*

Resource-sharing partnerships

Interviewees from both the Socorro Field Office and CNF said they are using a range of strategies to enlist other federal, state, or private partners to build workforce and equipment capacity and increase prescribed fire. Interviewees highlighted the importance of having leaders who were

willing to promote inter-agency or inter-jurisdiction resource sharing, even in light of the potential risk to professional success that can come with managing for more fire. Forest Supervisors on the Cibola, Santa Fe, and Carson National Forests pioneered an agreement to pool their resources and targets so that priority projects in the region would be guaranteed the necessary resources to succeed. They said this arrangement creates staffing efficiencies, a feeling of teamwork, and more confidence that resources will be available for planned projects. The Socorro Field Office also partners extensively to leverage resources and conduct cross-boundary burns, engaging, for example, the New Mexico Department of Game and Fish, New Mexico State Land Office, Department of Defense, Fish and Wildlife Service, Bureau of Reclamation, and private landowners. Interviewees explained that the Socorro Field Office and Forest Service also regularly support one another (despite the lack of formalized resource-sharing agreements between them). They share resources informally through “handshake” agreements, and typically only for “low dollar” items, like an engine crew, rather than “high dollar” items like helicopters or hotshot crews. Interviewees also described how the CNF had found creative ways to expand their capacity by engaging All Lands, All Hands; AmeriCorps; VetCorps; all-women’s; and Forest Stewards Guild crews. Interviewees explained that the success of partnerships typically hinge on key individuals:

“I do sometimes feel like our partnerships, where we’re successful is really just dependent on a few key individuals... We always have to have someone on the inside that’s willing to champion the effort and put in the extra effort to make it happen.”

Interviewees described how partnerships have benefits beyond increasing people power. Interviewees from both the Socorro Field Office and CNF described the key role that New Mexico Game and Fish’s Habitat Restoration Program and New Mexico’s State Forestry Division have played in funding NEPA analyses, helping with archeological surveys and thinning, and with on-the-ground burning. Furthermore, interviewees felt that engaging non-federal crews can be useful because

they are often more flexible, available, and reliable than federal agency crews, and they enlist members of the public who benefit from the learning experience and who may otherwise not be engaged. Finally, interviewees described how partners have worked together to propose two pieces of legislation to resolve barriers to prescribed burning. First, House Memorial 42 aims to resolve uncertainty about liability for escaped fires in New Mexico. Second, partners are working to pass a bill that will create dedicated recurring funding to state forestry that could be used to support many forest and watershed restoration practices, including prescribed burning.

Training and incentives for staff members

Many interviewees discussed ways that the Socorro Field Office and CNF train their staff and partners to conduct prescribed burning to increase workforce capacity, aptitude, and awareness of the benefits of prescribed fire while also increasing on-the-ground accomplishments. The Socorro Field Office sends staff members to the Prescribed Fire Training Center in Florida because they found that, *“It makes for better prescribed fire practitioners across the board.”* The CNF supports training for young adult crews from underserved and underrepresented backgrounds, and the Training Exchange (TREX) and All Hands, All Lands crews provide training to agency and non-agency individuals, including intentional efforts to support a more diverse workforce, such as Spanish language trainings. Several partner organizations, such as local fire departments and county staff, have assisted the Socorro Field Office in their burns as a training exercise for their own staff. One interviewee explained, *“It gives them the opportunity to learn.... Then, they can take that back and it benefits them when they get back in their home district.”*

Interviewees said that incentives and support from all levels of the Forest Service were critical to increasing prescribed fire programs on the CNF. Support from multiple levels created conditions under which staff members felt motivated

and able to implement burning. Interviewees said that having leadership emphasize prescribed fire makes people more comfortable taking risks to promote burning:

“From the Supervisor’s Office to the Regional Office... When you know you have support from above, that helps a lot.”

“They’ve managed, maybe by design, to get a lot of the right personalities all kind of pulling the road in the same direction.... Starting with the Forest Sup[ervisor] and working all the way down.... It creates that kind of virtuous cycle.”

Interviewees said that accomplishments create positive feedbacks and momentum to accomplish more burning, due to perceived decreases in the risk of burning and an improved sense of morale and possibility. Some noted that, as burning is becoming more common and accepted within the agency, it has become a source of pride and arena for healthy competition, which has actually fueled further prescribed burning accomplishments. Another interviewee explained that the negative attention that prescribed burning can sometimes attract is now more diffuse because burning is now more common than it used to be. Finally, interviewees explained that morale and motivation to burn had improved because landscape management objectives have started to feel more manageable as more prescribed burning has occurred in the area.

Outreach and communication

Interviewees said that both agencies and their partners have prioritized proactive outreach activities, such as media outreach, direct engagement, flyers, requesting feedback, and providing air filters, which they felt was a key foundation for increasing prescribed fire. Continued engagement over time is critical, according to some interviewees, in order to strengthen relationships, build trust, and offset the impacts of disinformation campaigns.

Some interviewees described the key role of partners in conducting external outreach/communication about agencies’ prescribed fire work. Partners can increase outreach capacity, have the ability to reach different audiences, and may have more rapport with some stakeholders. Interviewees said that the Forest Stewards Guild, The Nature Conservancy, Rio Grande Water Fund, New Mexico Prescribed Fire Council, and the Fire Science Exchange Network, funded by the Joint Fire Science Program, were key outreach partners. These groups and other organizations hold public events, engage directly with stakeholders, and host conferences while also providing meteorological information and administrative support to the agencies’ prescribed fire work.

Strategic planning

Interviewees said that NEPA planning has not been a primary constraint for the CNF and Socorro Field Office. Both units said they had more clearance than they needed, but they were both still exploring ways to improve efficiency of their NEPA planning. A few interviewees explained that the CNF’s NEPA analyses cover a wide set of prescriptions so they are able to burn in more conditions. The Socorro Field Office is planning more cool-season burning, when resources are more available and there is less escape potential for fires, as well as more cross-boundary burning, which they said can yield efficiencies when they do not have to hold fire lines along property boundaries. They also opt to use the “Determination of NEPA Adequacy” approach to reduce required planning work by allowing the agency to apply NEPA analyses completed in ecologically comparable areas to new projects:

“One of the things that we use quite a bit is actually what we call a DNA – Determination of NEPA Adequacy. For example, we have a project about 10 miles west of Magdalena..., we wanted to do similar things about 20 miles west of that, really similar ground, similar fuel types, similar stands, everything, and so..., we did a DNA for that.... Your wildlife biologist, and your archeologist, still have to sign off on wildlife, threatened and endangered

species, and cultural stuff, because obviously those are site-specific..., [but we] don't have to analyze soils again, because the soil impact is going to be the same, for example."

Both units also considered the tradeoffs of doing larger NEPA planning projects that addressed multiple resource objectives versus smaller, site-specific plans. One CNF interviewee explained that larger projects were in some ways more focused, efficient, and effective in attracting attention and competitive funding. However, interviewees also told us large projects can lead to deflated morale (e.g., when projects take a long time) and tie up the land base during planning. One interviewee cited the risk that wildfire or other events can impact the area if planning takes a long time. Several interviewees from both the Socorro Field Office and Magdalena Ranger District described evolutions in project size on their units in which the size of projects increased but then retracted more recently in order to be most efficient:

"Stakeholders were getting frustrated at the length of time that it was taking to actually implement some of these projects on the ground.... we [the Cibola National Forest] kind of started to recognize that and bring it down... [to] projects that we can use the categorical exclusion and get through these things in a timely fashion and keep our partners interested and keep everybody on board and at the table through implementation."

"Landscape is not necessarily something we [the Socorro Field Office] accomplish well these days. It tends to cost too much money, takes too much time, and it takes too many resources. So we're limiting our scope a little bit and not looking at 10,000 acres but getting down one to 3,000 acres."

Summary

The Socorro Field Office and the Magdalena Ranger District on the CNF in New Mexico were selected as a case study because of the resource-sharing efforts their leadership has championed and their successful implementation of prescribed burning despite significant resource constraints over the past five years. The primary barriers interviewees identified in implementing prescribed fire across this landscape were: lack of staff members and workforce at both agencies, including high turnover rates and insufficient planning staff members; administrative barriers, such as higher pay for working on wildfire suppression; general prioritization of wildfire suppression over prescribed burning by both agencies; a need for more formalized agreements to be able to share resources between the Forest Service and BLM, and between contractors and each agency; and a loss of resources and project implementation windows due to threatened and endangered species. Some of these challenges have been overcome by: developing formal and informal resource-sharing partnerships within and across federal, state, and private agencies in order to leverage funding and workforce; the development of a stronger culture of burning that is supported by leadership and reinforced by investments in staff member training; engaging partners to help with outreach and communication; and careful consideration of NEPA planning strategies to be able to maximize each unit's ability to accomplish acres that are planned given resource constraints.



Appendix C: The Sierra National Forest

Background

The Sierra National Forest (hereinafter, the SNF or the Forest) encompasses around 1.3 million acres on the western slope of the Sierra Nevada Mountains in central California. It borders Yosemite and Kings Canyon National Parks, as well as the Sequoia, Inyo, and Stanislaus National Forests, and county and private lands. The SNF's airshed includes the San Joaquin Valley, which one interviewee characterized as the *"dirtiest in the whole nation."* Interviewees in Phase One recommended the SNF as a valuable case study because of the complexity of challenges they face, partnerships with the State of California's Department of Forestry and Fire Protection (CAL FIRE), and intention to increase their prescribed fire activities.

The SNF has experienced extensive tree mortality due to multiple factors, including decades of fire exclusion and tree densification, historic drought for several years beginning in 2012, and subsequent drought-induced pine bark beetle infestations and mortality. The Forest has steadily

increased its fuels reduction targets in order to address this mortality and to reduce fire hazard. According to conversations with fuels program staff, their current target for all fuels reduction work is about 11-12,000 acres/year. In Region 5, targets are assigned to zones, so multiple forests can work together to meet their combined targets; this creates some flexibility based on operation windows, NEPA-ready acres, thinning contracts in place, and other factors. The SNF has focused their fuels work in wildland-urban interface areas surrounding communities. Their base budget for fuels work is around \$1 million/year but the Region has augmented this with additional funding in some years to address tree mortality or for priority prescribed burning. The Forest also has received additional money under the Joint Chiefs' Landscape Restoration Partnership.¹ We were not able to obtain exact numbers for the Forest's fuels program funding, but we assume that, with the base budget combined with these other sources, it is typically between \$2-4 million based on information from interviewees. In fiscal year (FY) 2018, the Forest accomplished 2,851 acres of broadcast

burning, 79 acres of jackpot burning, and 3,661 acres of pile burning. In FY 2019 they accomplished about 1,300 acres of prescribed burning, including both pile and broadcast burning, with lower accomplishments due to various factors, including a heavy winter and fewer than normal burn windows. In FY 2020, they expected to burn around 5,000 acres, even with the pause on burning operations due to COVID-19.

The Forest is divided administratively into the High Sierra Ranger District on the southern end of the Forest, and the Bass Lake Ranger District on the northern section. Interviewees indicated that the High Sierra District has had a robust burn program for more than 20 years with an active fuels division that has conducted landscape-level, broadcast burns since the early 1990s. In contrast, the Bass Lake District, an area with more desirable and accessible timber until recent beetle-induced mortality, has historically focused on timber production. Their prescribed burning has consisted primarily of pile burns, with occasional understory burns that are typically within timber sale boundaries. Starting in the early 2000's, the District has gradually increased the amount of burning, although interviewees said they could still substantially increase their program. Leadership on the Bass Lake District has recently emphasized the need for restoration work, including prescribed burning, but does not yet have a fuels division.

The Forest has an important working relationship with CAL FIRE. After around 25 years of minimal burning, CAL FIRE's leadership is following direction from the Governor and state legislature to increase fuels reduction targets and investments. The SNF is working on an updated forest plan under the 2012 planning rule. A draft was developed, but it is being revised because the condition of the Forest changed dramatically as a result of the drought and beetle epidemic. The SNF was also in the process of finalizing a forest-wide NEPA document for prescribed fire using a categorical exclusion and establishing a forest-wide Good Neighbor Authority agreement.

Primary challenges and barriers

Nearly all interviewees cited capacity as the primary factor limiting the program, along with on-the-ground conditions. More unique to the SNF are dangerous fuel conditions due to extensive tree mortality that make it more difficult to conduct prescribed burns safely.

Most interviewees discussed challenges associated with air quality concerns and weather unpredictability. While interviewees generally did not describe smoke permitting as a major barrier, a few thought this would become more challenging as the scale of burning increases. As one person said, *"Are we going to be able to double our prescribed fire and still attain the air quality standards? I think the jury's out on that."* Several noted that it is harder to burn in WUI areas because of residents' concern when smoke enters their communities. A few interviewees explained that competing land uses in the area, particularly large agricultural operations in the San Joaquin Valley, also create smoke or air pollution that can limit the SNF's ability to burn.

A few interviewees explained that threatened and endangered species or special heritage resources can make it more difficult to obtain permits for prescribed burns. They also noted that the interaction of community concerns about smoke, which makes burning preferable in the spring, and concerns about wildlife, for which burning in the fall is more desirable, can create challenges.

Interviewees explained that decreasing budgets mean the SNF has limited funding for actual project implementation. Interviewees noted that the Forest and other federal agencies have lost capacity and funding, so staff members have to compete for funds internally within the agency and seek non-federal sources of funding to implement projects.

Some interviewees said the SNF's prescribed burning work is constrained by a lack of staff members with the required skills and expertise. Most interviewees said the SNF has shortages of heritage and

other resource specialists, as well as insufficient implementation staff members, especially in the spring and summer. Several people noted that accessing personnel with fire expertise is difficult during fire season and is much more challenging for prescribed fire than for wildland fire, in part because there are more processes in place to facilitate resource ordering and sharing for wildland fire compared to prescribed fire. Interviewees on the Bass Lake District also noted that their staff members had less experience with prescribed burning, making it more difficult to build a program there:

“I think the Forest Service needs to look at their overall capacity. I mean, they don’t have enough people to implement. We could think of the most amazing project.... There’s no way we could carry it out because we are so understaffed and not just here as a Forest but I think as a Region.”

A few interviewees discussed internal dynamics they thought were limiting the ability to implement more fire. These interviewees explained that the Forest Service prioritizes wildfire suppression over prescribed burning, which impacts the ability to burn as staff members are pulled from prescribed burn work to staff wildfire suppression incidents. People also told us that work plans often prioritize meeting targets rather than doing the most ecologically important work. Some interviewees also noted that individuals may chase “easy” acres to meet accomplishments, or they may prioritize mechanical thinning because it is more certain to occur than prescribed fire, providing more certainty that they will be able to meet annual targets.

Facilitators and successful strategies for prescribed burning

We found there were four primary factors that interviewees pointed to as important strategies for increasing the use of prescribed fire on the SNF. These included:

- **Partnerships** to build capacity and share resources across organizations, particularly between the Forest Service and CAL FIRE;
- **Communication and information sharing**, particularly around air quality concerns;
- **Leadership** at both the Forest Service and State level that provide direction and incentives to increase prescribe burning; and
- **Forest-wide planning and state legislation** that provide incentives and resources to increase burning.

Many interviewees perceived increasing public tolerance for smoke and increasing political will for accelerating prescribed fire work in the communities surrounding the SNF. They described how drought and beetle kill combined with many intense fire seasons in California in recent years has created strong impetus at multiple levels to increase the use of prescribed fire:

“With the extreme fire behavior we’ve had in California over the last couple of years, it seems like communities and people are maybe more tolerant of smoke.... They know that there’s certain areas on the Forest like Bass Lake, like Shaver Lake, can be the next Paradise, and they don’t want that.”

Funding and partnerships

Most interviewees discussed the important role that external grant and emergency response funds have played in maintaining the SNF’s capacity for project implementation. Interviewees told us that the SNF only has enough funding to cover overhead and fixed costs, so external funds were critical for actual project implementation. As one interviewee explained, *“The appropriated money we’re getting isn’t enough.... It’s barely enough to cover the people’s salaries that work on the forests. Anything we need to do on the Forest, we’re doing with grants.”* Interviewees told us that state grants were particularly important sources, including funds from CAL FIRE, the California Climate Investments Fire Prevention Grant Program (CCI), and the Greenhouse Gas Reduction Fund (GGRF).

One person said, *“I don’t know how we would have made ends meet if we didn’t have those two bigger grants CCI and GGRF... CAL FIRE has got so much money right now...that there are many opportunities. You’ve just got to go out and apply for it.”* They also mentioned grants from the Joint Chiefs Landscape Restoration Partnership, collaborative groups, fire-safe councils, and private foundations.

Interviewees described how the SNF, particularly the High Sierra District, has maintained its capacity for prescribed burning in part by bringing in outside labor and equipment through in-kind partnerships, contractors, and resource-sharing with other agencies. Some interviewees also discussed resource sharing with the National Park Service, American Forests, and FireStorm contract crews. Most interviewees mentioned the key role of CAL FIRE crews (including National Guard and inmate crews deployed through CAL FIRE). Interviewees said partnerships with CAL FIRE on the High Sierra District add capacity for both organizations with mutual benefits for meeting accomplishment goals and building expertise. They further noted that CAL FIRE has clear direction and more resources than ever to accomplish work and support the SNF with staff members and financial resources:

“We’re going to expand [our agreement with CAL FIRE] to cover the entire Forest, which aligns perfectly with what they’ve been tasked by the Governor to do—to get much more involved in fuel reduction around communities.”

While individuals recognized the importance of fundraising and partnerships, some expressed concerns about possible long-term, negative consequences as well. Interviewees described mutual benefits to these resource sharing efforts, but some expressed concern that this practice of building capacity through partnerships might lead to a loss of SNF jobs and leadership in managing its lands. A few individuals expressed concern about the Forest Service becoming an agency that has to fundraise, and how this might affect the agency’s ability to execute their mission in the long-term.

Some interviewees discussed how a range of policy groups, task forces, and collaborative venues have helped improve coordination of fuels treatments both around the SNF and across the state. These included: the Air and Land Managers Group, Fire MOU Partnership, San Joaquin Valley Working Group, Governor’s Forest Management Task Force, and Tree Mortality Task Force. A couple interviewees described how the Dinkey Collaborative and Collaborative Forest Landscape Restoration Partnership (CFLRP)² project had supported planning efforts, increased social license, or brought in extra funding. These interviewees cited the group as a reason why the SNF was undertaking a forest-wide planning document for prescribed fire through a NEPA categorical exclusion (discussed more below):

“The way this forest-wide prescribed fire document really came to be is that members of our Dinkey Collaborative... really want to see a lot more burning done.... They went to the Regional Office and really championed money for us.”

Communication and information sharing

Most interviewees recognized that air regulators have become more willing to grant burn permits to the SNF as a result of increased communication and more wildfires. One interviewee explained that although permitting *“used to be the biggest barrier, [it] is definitely not any longer.”* Some interviewees mentioned the value of regular communication and the daily *“one-o’clock phone calls”* during which California agencies coordinate when multiple groups want to burn at the same time. Many interviewees noted the general value of efforts to improve communication with air quality regulators, and how it had led to a greater recognition among regulators that smoke from prescribed burning is less dangerous than wildfire smoke:

“All the cooperators, not just us, the Park Service, Fish and Wildlife Service and the state have helped convince San Joaquin [Air Pollution Control District] that it’s better to let us burn now than let it burn in a wildfire. So I think that’s made huge

strides.... If there's a good window for air, they're not restricting us."

"We've got a good enough rapport to where they know we're not going to try and take advantage, and we understand that we're working with some guidelines and some constraints. I think the working relationship's been good."

Interviewees said that more data collection around weather/air quality have helped the agencies identify additional burn days and demonstrate that prescribed burning is safer in terms of air quality than wildland fire. Several interviewees told us that multiple agencies have committed to entering their data into a statewide reporting system so that parties can have the data available to understand when fires are being permitted and completed. This is allowing for joint problem-solving around factors that may be restricting application of prescribed fire on days when air quality regulators have permitted burning. Interviewees also noted that the local Air Pollution Control District and California Air Resources Board (CARB) are both investing in more monitoring data to better understand smoke from prescribed fire so that they have better data to support decisions to permit prescribed fire.

A few interviewees described the importance of non-SNF efforts to spearhead communication with the public about smoke and prescribed fire. Key groups mentioned included: CARB, the Dinkey Collaborative, the local Prescribed Fire Council, and the Central Sierra Historical Society. A few interviewees described roles of different organizations:

"The Central Sierra Historical Society in Shaver Lake... put on educational programs over the last year on fire and talked... about prescribed fire, a historical perspective on how we got ourselves in this pickle through the years [and] how to restore our forest with the fire resiliency.... We've had a lot of good response from the public."

"What the Prescribed Fire Council now is doing is focusing on: how do we get across to the general public that prescribed fire is good and if it's a little smoke because of prescribed fire, that's really okay?"

"SB-1260 in California... [gave direction to] CARB to develop what we call a smoke app, which is patterned after US EPA Smoke Sense. Smoke Sense is specific to wildfires.... [This app] will be more broadly a smoke tool that the public can use to find out more information about causes of smoke in their area, what to do, who to contact, what the air quality is now, what it's expected to be, etc."

Leadership

Interviewees highlighted the importance of clear leadership direction within the Forest Service, SNF, and state government to increasing application of prescribed fire. Some interviewees felt that leadership has improved direction, incentives, and resources available for prescribed burning for state and federal agencies. As one SNF interviewee explained, *"From the national office, Regional Office down to the field, everyone recognizes that we need to do more landscape level treatments on the ground."* Interviewees also discussed the key state leadership role of the Governor's office, CAL FIRE, and the CARB:

"Our recent Governor Brown and newly elected Governor Newsom have issued executive orders to state agencies essentially requiring them to work together to come up with solutions for addressing the need to better manage our forests, and that includes prescribed burning as well as the other forms of forest treatment. And [the Governors] established a Forest Management Task Force... to oversee and coordinate with the agencies on whatever it takes to basically restore our forests to health."

A few interviewees mentioned the role of state policy and the California state legislature through State Bill 1260 and associated funding in providing direction to state agencies to increase prescribed burning, improve smoke monitoring and burn permitting, and increase multi-stakeholder collaboration. One person explained:

"SB-1260 in California...put forth requirements specific to prescribed burning. It requires [the CARB] to work with other agencies, including the local air districts, to establish a more detailed smoke

monitoring program associated with prescribed burning. It also requires a greater degree of coordination amongst state agencies for public outreach.”

Interviewees said that skilled, motivated, and experienced Forest Service staff members play a critical role in ensuring that prescribed burning is implemented. Interviewees explained the importance of a range of individuals in leading development of new strategies for increasing accomplishments:

“[Our planner] with the extensive fuels background... helped lead the charge in revitalizing the program, beginning to use new tools like Good Neighbor Authority... and really was the catalyst to get things like our forest-wide NEPA project for prescribed fire rolling down the road.”

Interviewees also explained how critical the High Sierra District’s dedicated fuels officer and integrated silviculture and fuels divisions (including an integrated management crew) were for their ability to maintain a high-performing fuels program. One interviewee said, *“We have some gifted and knowledgeable folks at the fuel technician and the battalion level and even one division chief. They are extraordinary.”*

Planning and policy

The SNF is developing a forest-wide prescribed fire NEPA assessment through a categorical exclusion, which interviewees believe will increase efficiency in fire planning. People said the approach could streamline specialists’ work before implementation, reduce the overall amount of time spent planning, and increase the time spent implementing projects. Other anticipated benefits were that a forest-wide prescribed fire NEPA decision would support a more holistic fire management approach, increase flexibility in where and when the Forest can burn, and support more cross-boundary burning. One person explained:

“[It will] help us to be more effective, more efficient in applying prescribed fire... With this prescribed fire NEPA, I can set up burn units that create some

consistency and tie into other projects... It’s going to allow us to pick anywhere on the landscape to go burn.”

However, some interviewees indicated that stakeholders and Forest Service staff members are concerned the forest-wide prescribed fire categorical exclusion will fail or is inappropriate. One concern is that it will not meet legal standards, while another is that it will create too little transparency and too much flexibility that will not be utilized in line with collaboratively identified management goals. We also heard that there is some concern among staff members that the resources they care for will be overlooked or mismanaged with a more flexible, condition-based NEPA approach.

Some interviewees discussed the value of policies and authorities that facilitate interagency resource-sharing and cross-boundary work, such as the California Fire Management Agreement, Good Neighbor Authority, and Wyden amendment. Several people noted that a fuels program staff needs to be knowledgeable about the different authorities and resources available; some authorities allow for the State to work on federal land or to contract with entities that the federal agencies cannot contract with directly. A few interviewees also discussed private land incentive programs, like the California Forest Improvement Program, supported by the State that motivate landowners to participate in fuels reduction that can then support cross-boundary prescribed burns.

Several other specific strategies being used to facilitate burns were described by a few interviewees, including smaller burn blocks, sequenced burning to create fuel breaks, and partnering with tribes to support cultural burning practices. People discussed the following:

- Dividing landscape-scale burns into smaller burn blocks could make it easier for air quality regulators to permit. Smaller, adjacent burn units (rather than a single, large unit) were thought to be easier for Air Pollution Control Divisions to permit because they could adjust the burn permitting incrementally as local conditions shift:

“One thing that we’ve [the SNF] been doing, which makes it more labor intensive on our end, is that we create a lot smaller units. What that means is we’ll try to put check lines in that give us 100-acre blocks... it creates a little bit less anxiety with the Air Board... [and requires less] lead time.”

- “Sequencing” plans and using “focal areas” to streamline planning and implementation of prescribed burning:

“We’re building fuel breaks around communities...then we’re going to back prescribed fire off these fuel breaks into the larger landscape.... It will allow... us to be able to burn on a bigger landscape, and not be so worried about, if something happens, and it gets away a little bit, [if it’s] going to impact the community because we’ve already hardened the community, and we work from the community out across the landscape.”

- Working to incorporate cultural burning into the Forest’s plans:

“Another thing we’re trying to do in this document is incorporate cultural burning.... There’s a lot of interest from the tribal community about this opportunity because that’s been an impediment for them doing some of the burning they wanted to do or helping us with the burning that we really didn’t always have NEPA coverage for.”

Summary

At the time of our work, the SNF was actively trying to increase their prescribed fire program. Their primary barriers were air quality concerns, conducting clearances to protect species and archaeological resources, dangerous fuel conditions, having adequate funding and staff capacity to conduct planning and implementation, and internal dynamics that made prescribed fire a lower priority. The SNF was increasingly using a forest-wide approach to accomplish their planning, most notably through a proposed forest-wide Good Neighbor Authority agreement with CAL FIRE and a forest-wide prescribed fire NEPA analysis that is to be completed through a categorical exclusion. Interviewees also highlighted the necessity of external grants and partnerships, particularly with CAL FIRE, to have sufficient implementation capacity. They said that leadership at the state level is adding valuable capacity, funding, and direction to increase prescribed fire. Interviewees emphasized the importance of resource sharing and open communication, particularly around air quality concerns, and pointed to the important role of local and state-level collaborative venues. Interviewees also pointed to the role of individual initiative, staff collaboration, and thoughtful planning approaches to overcome challenges and increase application of prescribed fire.





Appendix D: The Rogue River-Siskiyou National Forest

Background

Oregon's Rogue River-Siskiyou National Forest (hereinafter, the RRSNF or Forest) spans 1.8 million acres across southwestern Oregon and northwestern California. More than 100 years of fire suppression have left high fuel loads in some parts of the Forest. Large wildfires, such as the 500,000-acre Biscuit fire in 2002 and the 191,000-acre Chetco Bar fire in 2017, have become increasingly common. Phase One interviewees recommended conducting a case study in Southern Oregon and the Ashland watershed specifically because partners in this area have developed innovative and creative ways to accomplish cross boundary work. Furthermore, we selected this case because the state of Oregon revised its Smoke Management Plan (SMP) in 2019. The Rogue Valley is prone to smoke intrusions because it collects and holds smoke from many sources and locations, and we were interested in exploring how the RRSNF is affected by these new rules.

Interviewees indicated that in fiscal year (FY) 2018 and FY 2019, the RRSNF's annual hazardous fuels reduction target was 6,500 acres. The Forest has exceeded their targets every year for more than five years. In the four years prior to FY 2019, the Forest had accomplished nearly double its targets each year. Targets have been met primarily through mechanical thinning rather than burning,³ and prescribed burning accomplishments declined by more than 85 percent from FY 2018 to FY 2019. They also indicated that the RRSNF's total appropriated budget has declined by nearly 50 percent in recent years, and the overall fuels budget declined from \$4.3 million in FY 2016 to \$2.2 million in FY 2019. The RRSNF has begun to rely more heavily on internal supplemental fuels dollars that are less predictable to accomplish fuels reduction work. Each year, the Forest competes for "Targeted Fuels Investment" funds allocated by the Regional Office. They also compete nationally for Joint Chief's Landscape Restoration Partnership and Collaborative Forest Landscape Restoration Program funds that are allocated by the Washington Office.

The RRSNF is administratively divided into five ranger districts across seven counties that each have a different approach for funding and accomplishing hazardous fuels reduction work. The Powers and Gold Beach Ranger Districts are jointly managed, and the Fuels Specialist⁴ and Fuels Technician based on the Gold Beach District provide fuels staffing for both districts. These two districts fund fuels work with Knutson-Vandenberg funds retained from timber sales, supplemental fuels dollars, and some appropriated fuels dollars. The Wild Rivers Ranger District receives both appropriated and supplemental dollars and has a single fuels staff member who packages work to engage contractors or Forest Service crews. The High Cascades Ranger District typically uses Knutson-Vandenberg funds associated with timber sales to accomplish fuels work.

The Siskiyou Mountains Ranger District is the main focus of this case study due to a high-profile, multi-stakeholder, partnership project called the Ashland Forest Resiliency (AFR) project that has brought federal, state, city, and private resources together to complete landscape-scale, cross-boundary hazardous fuels reduction projects in the Ashland Creek Watershed. The District has also engaged in several smaller projects with supplemental fuels dollars and added to their fuels workforce by hiring a Fuels Technician. AFR partners have treated approximately 13,000 acres on Forest Service, City of Ashland, and private lands in and around the Ashland watershed between 2010 and 2019. In that time, they also secured \$10 million in federal and state grants for fuels treatment and community engagement.⁵ Although many interviewee comments described dynamics for the whole Forest as well as within the state of Oregon, results discussed below are focused primarily on what we heard specific to this District.

Primary challenges and barriers

Interviewees said the primary constraint to increasing burning on the RRSNF was lack of funding, except for in the AFR project area where smoke permitting was a more important constraint. Var-

iable public tolerance for burning and smoke has been another considerable challenge in this landscape. Further, it was notable that workforce availability is not a primary constraint due to the abundant contractor capacity available locally.

Interviewees described how topography, weather, geology, and biological factors make it particularly challenging to burn on the RRSNF. The natural terrain of the Siskiyou Mountains Ranger District creates “a funnel down into the city” toward the city of Ashland, so prescribed burning can result in smoke impacts in population centers; however, smoke intrusions from prescribed burning have been significantly less intense and shorter-lived than summer wildfire smoke impacts. The soil type across the Forest does not retain moisture well, fuel types tend to carry fire easily, and some areas are high enough elevation that they are covered in snow for much of fire season. These conditions combined with drought, steep slopes, heavy fuel loadings, fast regenerative growth, and presence of threatened and endangered species all make for difficult logistics, high costs for initial entry and maintenance, and dangerous consequences if prescribed fires escape.

Interviewees said that communities in the Rogue Valley, including the city of Ashland, have endured high levels of smoke, which has created a difficult social and political context for increasing prescribed burning. One interviewee described the occurrence of “insufferable” levels of smoke due to wildfires for six to seven weeks during the previous two summers. This exposure, according to interviewees, had exhausted some residents’ tolerance for smoke. Nearly all interviewees explained that local county commissioners and some citizens had advocated against prescribed burning in past years. The RRSNF leadership made two decisions to help improve relationships with local communities: (1) not burn during the Oregon Department of Forestry’s (ODF) declared fire season (approximately June through October), and (2) suppress all naturally ignited wildfires immediately. Interviewees recognized that leadership made these decisions in an attempt to ease tensions with county government and gain social license. Some thought this

was an effective strategy; others thought it compromised forest health and community safety by limiting their ability to conduct fuels treatments. However, many interviewees also noted increasing public support for and awareness of the need to use mechanical thinning and prescribed burning to proactively reduce wildfire smoke. One interviewee noted that the county commissioners had even created a public information video series encouraging thinning and prescribed burning in the “off season” (while still advocating for full suppression of all wildfires during ODF-declared fire season). Some interviewees noted that this position, although more favorable toward burning than previous positions, was still limiting to the Forest because the best time to conduct prescribed burns in many of the RRSNF’s high-elevation areas is often during the summer (when the snow is melted).

Interviewees told us that securing burn permits is a significant challenge, especially near Ashland. Interviewees told us that efforts to work directly with ODF to increase the number of allowable burn days had been cumbersome but had eventually resulted in increases. Interviewees speculated that the new SMP⁶ will further increase allowable burn days. However, the city of Ashland is designated as a Smoke Sensitive Receptor Area (SSRA) in the new plan, which means that the area is subject to additional protections from smoke intrusions, including a new “one-hour standard” for air quality that limits burning that creates a short spike in air impacts, even if there is no extended exposure. Some of the most important treatment areas near the city of Ashland almost necessarily fall into this pattern, and, therefore, it will not be possible to burn them. Interviewees told us that the city of Bend successfully petitioned for an exemption to the one-hour standard in the new SMP in 2019,⁷ and interviewees indicated that the city of Ashland intends to request the same exemption for 2020.

Interviewees said a lack of funding and agency staff capacity was a key barrier to implementing prescribed fire and maintaining treatment areas. Some interviewees explained that national- and state-level Forest Service leadership is supportive

of increasing prescribed fire, but they do not fund or incentivize that work on the ground sufficiently to increase accomplishments. Interviewees observed that fuels treatment often seemed to be a lower priority, especially compared to wildfire suppression and meeting timber targets. One interviewee described fuels treatment as feeling like an “*afterthought*,” which was a source of frustration to those who put in the upfront work to plan burns that were not subsequently implemented, particularly when ample funds were available for wildfire suppression. Interviewees also described a lack of agency staff and lack of funding to hire available non-agency contractors. One interviewee explained that, “*across the Forest we have 68,000 acres under decision that’s been planned that we are just lacking funding and resources to implement.*” In particular, interviewees identified lack of funds for maintenance of treatments as a key issue for the RRSNF, except for the AFR Project. In southern Oregon, ecological conditions require repeat burning (and often mechanical treatment) in treated areas every seven-to-ten years. Some interviewees said that maintenance was difficult because funding sources tended to prioritize new projects. However, maintenance funding was not the primary constraint for the AFR Project, which has an approximately \$350,000 funding stream available each biennium for project maintenance collected from a water fee charged to all users in the City of Ashland. At the time of our interviews, the AFR Project had not yet spent all allocated maintenance funds since the fee was implemented in the 2013-2015 biennium, suggesting that factors beyond funding, such as smoke permitting, constrained progress more than funding.

Staffing gaps and turnover were described as significant drains on the RRSNF, especially among fire staff members. Interviewees also discussed particular staffing gaps that created bottlenecks, such as a lack of type one burn bosses, advanced agency administrators to authorize prescribed burns, and administrative capacity to administer contracts. Some interviewees believed that employees leave due to the Forest’s high-stress work environment or conservative decision-making. Two interviewees explained:

“This Forest has a reputation of being one that’s in a bit of a political hot seat.”

“Some employees have basically just taken other jobs, and they’re like, ‘If this Forest isn’t going to burn and you guys aren’t going to do the right thing on the landscape, I’m going to go someplace else because you don’t need me around here.’ And people have taken other jobs and are looking to take other jobs.”

Interviewees described a number of administrative issues that present significant barriers to ensuring the capacity needed to staff prescribed burns. Some interviewees said that staffing prescribed burns is made difficult by burdensome and limited windows for hiring, restrictive funding, training during burn windows, and funding that comes too late in the year to support successful recruitment and hiring. A few interviewees told us that there were also a number of administrative challenges when they turned to contractors to resolve labor shortages. For example, some contractors do not carry the liability insurance required nor want to assume liability, and the Forest Service sometimes does not allow contractors to be burn bosses, essentially limiting the scope and scale of work.



Facilitators and successful strategies for prescribed burning

Interviewees in the RRSNF case study pointed to several key variables that had led them to be successful, in particular:

- Focused and sustained investments in the Ashland Forest Resiliency Project;
- Broad and nimble partnerships that leveraged additional workforce capacity, funding, and outreach support;
- Regulatory process and policy improvements, such as state-level smoke regulation changes and improved rapport with the agency responsible for granting smoke permits; and
- Consistent and thorough communication and outreach about both the reasons for using prescribed fire and the tools to cope with smoke impacts.

Focused and sustained investments in the Ashland Forest Resiliency Project

Interviewees cited the collaborative Ashland Forest Resiliency (AFR) project as an important success on the RRSNF. Interviewees attributed the AFR’s success to early and sustained funding, continuity of people involved, trust between partners and the community built through outreach, weekly partner meetings, and the “right” mix of partners and stakeholders that included: the city of Ashland, the Nature Conservancy, Lomakatsi Restoration Project (a nonprofit that develops and implements restoration projects),⁸ and the RRSNF. Interviewees described how federal stimulus funds from the American Recovery and Reinvestment Act of 2009, ongoing funding from partners, and the city of Ashland’s user fee that generated funds for maintenance work in perpetuity also helped the project succeed:

“We really were blessed [with AFR] when we got that economic stimulus money... because you build these partnerships, you build these collaboratives,

and our partners-- rightfully so-- expect results. They don't want to go to 20 years' worth of meetings and consensus building and all that only to see a project languish on the vine because we don't have the money to implement it. So, having the relationship built was big. Having the dollars to start off and be serious about it was big, and then being able to sustain the funding and the interest level has been huge. They're 10 years into that project, and they still do regular meetings with all the partners, and they still have all the coordination meetings and stuff like that going on. So, I'm saying, once you get that partnership built, it still takes a significant amount of energy to maintain it. You can't just build it, and then just assume that's going to run itself. There's a lot of energy that goes into it."

Despite this success, interviewees recognized that the RRSNF is socially and ecologically heterogeneous, and some speculated that many aspects of the AFR model are not likely transferable to other areas of the Forest. Although certain aspects of AFR are not likely transferrable, some aspects of the project have already been replicated, including a Stewardship Agreement that now applies to the entire RRSNF, state funding for fuels work, integrated timber and fuels treatments, and collaborative planning.

Partnerships

Interviewees recognized that much of the workforce capacity the RRSNF is coming through partnerships, especially with contractors and the ODF. A range of partnerships have allowed the Forest to access a larger and more flexible workforce and take advantage of other groups' relationships with certain community members. Interviewees explained that the RRSNF relies heavily on the workforce provided by contractors to meet accomplishments. The Forest's indefinite delivery/indefinite quantity contract with Grayback Forestry allows the contractor to provide an indefinite quantity of service during a fixed period of time. These agreements are important because, as one interviewee explained, *"we don't have to go out and solicit for new contracts.... We can get the*

money spent pretty quickly." This is especially important given that the agency can sometimes lose funding if they are unable to use it quickly.

Interviewees thought it was particularly beneficial for the RRSNF to partner with ODF given that many local residents in the area trust ODF. Interviewees told us how the Forest has benefitted from improving its own relationships with ODF, establishing a Mutual Aid Agreement with ODF, and being able to use the Good Neighbor Authority to increase the pace and scale of work by leveraging ODF support to conduct prescribed burns, but also to sell timber sales, potentially conduct NEPA, and other on-the-ground assistance. One interviewee explained:

"Both [ODF and the Forest Service], we support each other. We have mutual aid agreements so we both respond during a wildfire and those same crews and engines are available for backup and support when we do prescribed fire. So I think we're in a really great place as far as our working with our partners."

Interviewees also described how partners also helped the AFR partnership leverage additional funding for on-the-ground work. The Forest Service, city government, a non-profit, and private business all came together to leverage their resources and positions to pursue funding to make their collaborative project succeed:

"Environmental folks and The Nature Conservancy and Lomakatsi and others have helped come together to apply for outside funding [for AFR]. We got a few million dollars from the [Oregon Watershed Enhancement Board] money for current work. We did NEPA through appropriated dollars and with our Forest Service staff, but the implementation of a lot of that work is going to be accomplished with our partners with outside dollars."

Interviewees also noted mutual benefits to partnerships. Several described how they create training opportunities and increase social acceptance for burning in the community which could lead to more work for various partners. One contractor ex-

plained, “It provides us training for people. We’re promoting prescribed burning in the community. There’s this big awareness that ‘hey, this worked, let’s do more of it.’”

Regulatory process and policy improvements

Interviewees explained that staff members from the RRSNF had worked with ODF (who administers the smoke program on behalf of Oregon Department of Environmental Quality (ODEQ)) to improve air quality permitting processes over time. Interviewees described factors that had improved relationships, such as burners sending pictures of smoke impacts to regulators, sharing information via real-time cameras, in-person visits from regulators, and regular phone conversations. Interviewees told us that more frequent interactions had led to greater trust, which had enabled ODF to give burners the benefit of the doubt more often:

“In the early years [AFR] was very limited by approval from the State for smoke.... That’s really changed in that timeframe from then until now we’ve, we’ve worked with the State, we’ve invited them down.... Now we have much more flexibility on borderline days to go light a few piles, test, see how we’re doing (with smoke), and then it’s more of an adaptive management style. And that, like all kinds of relationships, just took some time to build relationships and to build trust. So I would say that is a really, probably one of the biggest factors for our ability to do prescribed fire.”

Interviewees also discussed the potential positive impacts of Oregon’s new SMP and the Forest Service’s planned 2020 Fire Fix on prescribed burning. Interviewees anticipated that the new SMP will allow burns that would not previously have been allowed, but the changes were too recent for them to confidently say that they had occurred. Interviewees did seem concerned that the one-hour smoke standard could pose a problem for burning in Ashland; however, they were hopeful that an exemption will be granted to the city of Ashland. One interviewee was hopeful that the Forest Ser-

vice’s planned 2020 fire funding fix,⁹ would help resolve some of the Forest’s budgetary issues and enable more prescribed fire on the RRSNF. The fire funding fix will create a disaster fund that the Forest Service can use to pay for fighting wildfires without depleting funding from other parts of their budgets, such as fuels treatment funds.

Outreach and communication

Interviewees felt that active and consistent outreach, especially in the AFR project, was important for gaining public support and increasing understanding of the importance of prescribed burning. The AFR project has hosted dozens of field tours for the public, politicians, school groups, and more. Interviewees described how the project team works with university students to conduct research, and shares outreach materials as broadly as they can. They also described their efforts to make sure the public is aware of and supportive of their work by directly reaching out to landowners, conducting public input meetings, and creating public alert systems for burning. Some interviewees noted that RRSNF leadership is focusing on improving public outreach to improve relationships and trust with local residents. A key aspect of the outreach focused on having the Forest take the time to explain the reasons behind the actions, versus just telling people what it was going to do:

“We’ve had a massive campaign effort... to market what it is we’re going to do. Not just make a decision and then nobody knows about it. [The Forest has] told the world on TED talks... public radio stations... met with several civic groups and rotaries.... Because what was really missing from the narrative of the Forest Service that was really hindering relationships was our intentions.”

Interviewees described how having diverse partners assist with outreach and communications increases capacity to reach different audiences. Primary communication partners in the AFR project mentioned by interviewees included: the Ashland Chamber of Commerce, The Nature Conservancy, Lomakatsi, the City of Ashland, and the Ashland

Fire Department. Interviewees explained that each partner had differing motivations to contribute to the effort, such as being concerned about the impact of fire and smoke on the local economy, ecosystem, or community safety. One particular communications success story was the City of Ashland and Ashland's Chamber of Commerce collaboration to produce the Smokewise Ashland program.¹⁰ One interviewee explained that this was an effective outreach campaign because it also provided solutions for how people can cope with smoke and stay healthy when there is smoke in the air.

Summary

Although the RRSNF accomplished more than double its fuels reduction targets each year from FY 2015 to 2018, interviewees still found insufficient funding and staff capacity to be major barriers to increasing the use of prescribed fire across the whole Forest. However, these barriers were not as significant within the AFR Project specifically. Other primary challenges included securing burn permits due to problematic smoke intrusions, building understanding and social tolerance for prescribed fire, and administrative challenges. It

has been difficult to secure burn permits under Oregon's previously more restrictive air quality regulations, but a 2019 revised SMP may resolve some permitting difficulties in the future. Interviewees attributed successes to: partnerships that they have developed with agencies, contractors, and other organizations to leverage workforce capacity and social relationships; improved rapport with the agency responsible for granting smoke permits as a result of focused efforts to communicate more often and effectively; and outreach to the community about the importance of prescribed burning as well as strategies and tools for those impacted to be able to cope with the smoke effects. The Forest and partners' commitment to focused and sustained investments in the AFR Project, a long-term effort that has brought federal, state, city, and private resources together to complete landscape-scale, cross-boundary hazardous fuels reduction projects, has demonstrated one extraordinary model that has resulted in significant hazard reduction accomplishments, but interviewees were cautious to suggest that replication of that model would be possible or advisable in other contexts. The experiences gained through AFR and related projects will help inform the process of addressing wild-fire and smoke issues on a regional level.



Endnotes

- 1 USDA Natural Resources Conservation Service. n.d. Joint Chiefs Landscape Restoration Partnership website. <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?cid=stelprdb1244394>. Last accessed 21 May 2020.
- 2 USDA Forest Service. n.d. Collaborative Forest Landscape Program website. <https://www.fs.fed.us/restoration/CFLRP/>. Last accessed 21 May 2020.
- 3 The Forest completes 2,000 to 3,000 acres of pile and jackpot burning each year as part of their brush disposal program following timber sales that are not counted toward their fuels targets.
- 4 Fuels Specialist position on the Gold Beach Ranger District was vacant at the time of publication.
- 5 Shibley, Mark. A. 2020. Public Perceptions of Ashland Forest Resiliency Project and Forest Restoration: A Longitudinal Study of Ashland Residents, 2012-2019.

More information about the Ashland Forest Resiliency Project is available on the project website: <https://www.ashland.or.us/Sectionindex.asp?SectionID=503>.
- 6 Oregon Public Law. n.d. Oregon Rule 629-048-0140. Smoke Sensitive Receptor Areas website. https://oregon.public.law/rules/oar_629-048-0140. Last accessed 21 May 2020.
- 7 State of Oregon. 04 March 2020. Smoke Management Rule Staff Update. https://www.oregon.gov/odf/Board/Documents/BOF/20200304/J_BOFSR_20200304_06_Smoke%20Management%20Rule%20Update.pdf. Last accessed 21 May 2020.
- 8 Lomakatsi Restoration Project. n.d. <https://lomakatsi.org/>. Last accessed 21 May 2020.
- 9 USDA. 23 March 2018. Press Release Number 0064.18: Secretary Perdue Applauds Fire Funding Fix in Omnibus. <https://www.usda.gov/media/press-releases/2018/03/23/secretary-perdue-applauds-fire-funding-fix-omnibus>. Last accessed 21 May 2020.
- 10 City of Ashland. n.d. Smokewise Ashland website. <https://www.ashland.or.us/SectionIndex.asp?SectionID=534>. Last accessed 21 May 2020.

