



United States
Department of
Agriculture

Forest
Service

Southwestern
Region

February 2013



Draft Scoping Report for Southwest Jemez Mountains Restoration

Santa Fe National Forest Sandoval County, New Mexico



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means of communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TTY). To file a complaint of discrimination, write to USDA, Director of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TTY). USDA is an equal opportunity provider and employer.

About This Scoping Report

This report summarizes our public involvement efforts and the comments received about the proposed action for the Southwest Jemez Mountains Landscape Restoration Project. We also identify the significant environmental issues and describe potential alternatives to the proposed action.

The purpose of the project is to restore ecosystem structure and function and increase resilience to disturbances such as high-severity wildfire, climate change, or insect and disease outbreaks. The treatments include thinning, prescribed burning, meadow and riparian area restoration, road maintenance and decommissioning, cultural resource protection, invasive plant control, and terrestrial (land) and aquatic wildlife habitat improvement. Treatments would be implemented over 8 to 10 years. Details of the restoration treatments are found in the [Proposed Action](#).

Scoping for the project started with the publication of the [Notice of Intent](#) to prepare an Environmental Impact Statement on July 11, 2012. The purpose of scoping is to gather public input on the issues we should consider and evaluate in preparation for developing the draft environmental impact statement (DEIS).

The Santa Fe National Forest solicited comments from agencies, Tribes, organizations, and individuals. The comments and responses are organized by topic and include the associated comment numbers. The complete text of all the comments is available in the [Public Comment Reading Room](#) for this project and is also available upon request by contacting Chris Napp at the Santa Fe National Forest headquarters, 505-438-5448, or cnapp@fs.fed.us.

Summary of Public Involvement Efforts

During the spring and summer of 2012, we used several methods to solicit comments on the proposed action: field trips, public meetings, letters, and the project website. The meetings and field trips were publicized in local newspapers (the Jemez Thunder, Los Alamos Monitor, Santa Fe New Mexican, and Albuquerque Journal) and on public radio station KUNM (Albuquerque).

We held pre-scoping meetings in Santa Fe (March 10 and 29, April 12) and Jemez Springs (March 8 and 31, April 14). The purpose of the meetings was to update people on the planning process and get comments on the restoration proposal. A total of 98 people attended these meetings.

The forest held three field trips for the public on June 2, June 30, and July 14. Fifty-three people went on the field trips. The purpose of the field trips was to show people examples of the kinds of restoration treatments we would like to do and to hear people's thoughts and questions about these treatments.

A field trip for other federal and state wildlife agencies, and conservation organizations took place on June 8. The purpose of this field trip was to look at opportunities for thinning, meadow restoration, and aspen regeneration in Mexican spotted owl habitat.

We sent a scoping letter by surface mail or electronic mail to the nearly 500 individuals, organizations, and agencies on our mailing list on July 12, 2012. This letter notified people about

the proposed action, scoping opportunity, schedule of public meetings, and the various ways to submit comments.

Four public meetings were held in July and August 2012: July 24 (Albuquerque), July 26 (Albuquerque), July 31 (Jemez Springs), and August 2 (Santa Fe). A total of 81 people attended the meetings.

Nine individuals submitted written comments at the public meetings and 90 individuals, agencies, and organizations submitted comments by letter, email, or the online comment form; this includes form letters.

How We Analyzed the Comments

All comments were entered into the Comment Analysis and Response Application, an online database used for managing and storing comments. As noted above, the comments are available in the [Public Comment Reading Room](#) for this project.

Next, the interdisciplinary team read and coded the comments. Similar comments were grouped together and summarized in a short statement. These statements were defined as 1) issues or 2) concerns. The team's resource specialists reviewed and responded to the issue and concern statements. The issue and concern statements and responses are found at the end of this report.

Issues and Concerns—What They Are and How They Are Used

Issues are points of discussion, debate, or dispute about the effects of implementing the proposed action. An issue may also address whether or not the project would achieve the desired outcomes (the purpose and need). Other things that can be issues are decision criteria from the responsible official (the forest supervisor in this case) or legal requirements, such as the Endangered Species Act.

We use issues to develop alternatives, develop mitigation measures that reduce unwanted effects, and to evaluate and compare the effects of the different alternatives.

Issues differ in their level of importance. Their importance depends on:

- extent (geographic location)—where the effects would occur;
- duration (time)—how long effects will occur); or
- intensity (degree)—amount of change or degree of interest or conflict.

Concerns are not issues. They are not issues because they are:

- outside of the scope of the project (reintroducing wolves);
- already part of the proposed action (cutting trees);
- already decided by law, policy, or regulation (disclosing cumulative effects);
- irrelevant to the decision being made (vegetation should be tested for harmful chemicals before treatments start);
- conjectural and not supported by scientific evidence (California condor habitat will be affected);

- comment, opinion, or position statement (I do or do not like this proposal);
- the effects are limited in extent, duration, or intensity (Logging trucks will pass by the campground no more than 4 times in a 10-hour day.); or
- questions or requests for information (What is an enclosure?).

The Issues and Development of Alternative Treatments

Through the process of reviewing and coding the comments, the interdisciplinary team identified 13 issues. These issues focused on: use of prescribed fire and its effects on environmental and human health; tree cutting, including cutting large trees and its effectiveness at reducing fire risk; temporary roads; and habitat for Mexican spotted owl and northern goshawk. The issue statements are found in the last section of this report.

Alternatives will address issues raised during scoping and by the interdisciplinary team. Some will be analyzed in detail in the DEIS. Others will not be analyzed in detail. Alternatives that will be reviewed by the interdisciplinary team include:

- The no action alternative (Alternative 2).
- Prescribed burning only in mechanical treatment areas (Alternative 3).
- No prescribed burning in mechanical treatment areas (Alternative 4).

Alternatives reviewed by the interdisciplinary team, but eliminated from detailed analysis at this time include:

- No construction of temporary roads and no road reconstruction.
- Use of a 16-inch diameter cap on all treatments.
- Reducing the prescribed burning area by using skyline logging on steep slopes (greater than 40 percent).
- Protection of the Jemez Mountains salamander.
- Modification of treatments in Mexican spotted owl protected activity centers and restricted habitat.

The effects of the proposed alternatives will be evaluated and compared to the effects of the proposed action alternative and the no action alternative. As the analysis process continues, we may develop and consider other alternatives. More information about alternatives that were considered but eliminated from detailed study and those that will be evaluated in detail will be provided in the DEIS.

Next Steps

The DEIS is underway, and we expect to complete it by August 2013. Comments are welcome at any time, but the next opportunity for formal public comment will be the 45-day comment period for the DEIS.

Our Responses to the Comments Received

The comment (letter) numbers related to the particular issue or concern are listed after the statement. The table at the end of this section cross-references the commenter's name, letter or comment number, and issue and concern numbers. Again, the letters can be found in the [Public Comment Reading Room](#). We appreciate the interest, involvement, and support of everyone who commented.

The numbers used for the issue and concern statements match those found in our database and are used for tracking purposes. Issue and concern statements were combined or split after the team's original review, and the statement numbers are not in order.

Issues That We Will Address

These are the issues identified during the public scoping period. We will address these in the DEIS.

Issue 7

The use of potassium permanganate to ignite fires using aerial ignition will have detrimental effects on human health, wildlife, soils, water, and air quality. (Comments 27, 38, 45, 57, 60, 72, 85)

Response

To achieve the project's purpose and need of reintroducing the process of low-intensity surface fire into ponderosa pine ecosystems, prescribed burning will have to take place. Potassium permanganate is a chemical used in aerial ignition devices commonly known as ping-pong balls. The interdisciplinary team considered not using ping-pong balls by using other aerial ignition methods (helitorch) or through hand ignition on the ground to ignite prescribed burns.

Forest Service fire managers have to consider multiple factors regarding the use of prescribed fire as part of this project, including how to reintroduce fire in a manner that is safe for firefighters implementing prescribed burns.

Ping-pong balls and other prescribed burning ignition devices were assessed for human health and ecological risks in [Residues of Fire Accelerant Chemicals](#). This report found that there were no risks to human health or general wildlife species from the chemicals in or residues of ping-pong ball ignition devices. There is little widespread exposure to human or animal populations from the potassium permanganate, its residues, or the plastic balls. This is because the amounts of chemicals are very small and they are spread over a large area. Direct contact with or ingestion of the residues is also unlikely. Any particles or gases in the smoke from the fire would be quickly dispersed throughout the atmosphere.

As explained above, these options were eliminated from consideration because they would not meet the purpose and need. Either the helitorch or hand ignition methods expose firefighters to elevated risks of managing the prescribed fire versus the level of concern about the use of ping-pong balls.

Please see the responses to Issues 30, 31, 45, and 61, which also address prescribed burning.

Issue 11

Cutting large trees to meet the purpose and need is not supported by science. Removing old or large trees will forfeit ecological benefits and increase the risk of high intensity wildfires. (Comments 16, 24, 27, 30, 40, 43, 45, 68, 76, 91, 108)

Response

Many commenters said that we should not cut trees over 16-inches diameter. Setting a limit on the size of trees that may be cut is known as a diameter cap. The proposed action does not include a diameter cap with the exception of the Mexican spotted owl protected activity centers, where we have proposed a 24-inch diameter cap. We would need a site-specific forest plan amendment to cut trees larger than 9-inches diameter in protected activity centers. Forest plan diameter limits would apply to thinning and tree cutting projects outside of protected activity centers.

We developed the proposed action to achieve several ecosystem restoration objectives, not only to reduce wildfire risk. Cutting larger trees would reduce hazardous fuels, but more importantly, removing larger trees in certain situations would improve ecological conditions. In protected activity centers, removing larger trees would improve spotted owl habitat by creating structural diversity. We are working closely with the U.S. Fish and Wildlife Service to design treatments in owl habitat.

The effects of the proposed treatments on all size classes will be analyzed using vegetation structural stage (VSS) distribution and by modeling what is removed by size class. Using a diameter cap was eliminated from detailed analysis because it would not meet the purpose and need for the reasons explained below. More detail will be provided in the DEIS and project record.

Cutting larger trees for restoration purposes is supported by science. A study by Triepke et al. (2011) modeled and analyzed the effects of a 16-inch cap on forest structure, forest composition, and fire behavior on dry forests on national forest lands in New Mexico and Arizona. Their analysis showed that within 30 years, nearly all stands managed using a diameter cap would be converted to an even aged condition. Such a landscape lacks biodiversity and indicates that the system is unstable and is susceptible to large-scale disturbances such as wildfire.

A related issue is contour felling. Felling trees along the contour, or parallel to the slope, may be appropriate in some situations. Contour felling is most often used after wildfires to reduce erosion on steep slopes. Contour felling does not meet the purpose and need of the project because one of the goals of the project is to remove wood products and most logs would be destroyed during the prescribed burns.

Some commenters listed additional concerns about tree cutting that are addressed elsewhere:

- creation of a citizen oversight board (see response to Concern 5).
- having local cooperatives do the thinning and harvesting (see response to Concern 12).
- creating defensible space around homes and communities (see response to Concern 39) .

Issue 14

The DEIS must analyze the effects of habitat alteration on wildlife populations. (Comments 27, 28, 40, 57, 70)

Response

The effects of the restoration treatments on wildlife habitat and populations will be analyzed and disclosed in the DEIS.

Issue 21

Improving existing roads and constructing temporary roads are unnecessary, will lead to unsightly gravel pits, more ATV use, and the spread of nonnative invasive plants. It should be removed from the proposal. (Comments 20, 27, 108)

Response

Improvements to the existing roads and construction of temporary roads will be needed to access and implement the proposed treatments and to remove wood products. All temporary roads would be decommissioned after use.

The existing road network is not adequate to implement the restoration treatments. Many of the roads are unsafe for travel by vehicles used for firewood gathering or prescribed burning. Old road designs do not meet the needs of larger vehicles that would be used for restoration treatments or to transport forest products.

Gravel from the proposed gravel pits would be used to pad over rock outcrops in the road to make them passable and to reinforce rolling dips (drainage structures) in the roadway. Our preferred locations for gravel pits are already established pits that were developed and then closed and restored. We would reopen, crush gravel, and after operations are over, we would reclaim the site again. Where new pits are required, the site would be less than 5 acres in area and would be reclaimed after closure.

Reconstruction and maintenance of existing roads would decrease resource damage by correcting poor road alignment and drainage conditions. This would reduce soil loss and sedimentation rates and impacts on cultural resources. The design criteria for the project will include measures for reducing the spread of invasive plants. The road decommissioning component of the project will result in a significant net decrease in road density even with the proposal to build a few new temporary roads (e.g. short spur roads).

We considered an alternative that eliminated construction of temporary roads and improvement of existing roads. This alternative was eliminated from detailed analysis because it does not meet the purpose and need of the project for product removal and provide for improvements to watershed condition.

Issue 26

The proposed action does not disclose how the thinning and harvest activities in northern goshawk habitat will implement canopy cover standards for northern goshawk, how interspaces

factor into VSS-1 distribution, or how the forest plan standards and guidelines for northern goshawk will be amended. (Comments 91, 108)

Response

The DEIS will analyze and disclose the effects of incorporating standards and guidelines for goshawk management. The analysis will also look at the recommended VSS (vegetation structural stage) classifications, interspaces, and canopy cover that would promote habitat for at least 14 goshawk prey species. Because the Santa Fe forest plan does not address some aspects of the implementation of these guidelines, we have proposed a project specific forest plan amendment. The text of the proposed amendment will be provided in the DEIS.

One commenter referred to a document titled “Implementation Guide, Region 3, Northern Goshawk Standards and Guidelines.” These are not “new goshawk guidelines”. This guide is an internal document that was “...designed to help project developers understand the importance and mechanics of how to design projects to meet the standards and guidelines for the northern goshawk as they are outlined in the Record of Decision (ROD) 1996 Amendment of Forest Plans for the National Forests in Arizona and New Mexico (Plan Amendment),” (p. 1).

The treatments and environmental analysis will follow the guidance and direction for management of northern goshawk found in appendix D of the forest plan.

Issue 30

Prescribed burning creates smoke that negatively affects human health. (Comments 2, 14, 28, 33, 36, 41, 45, 53, 57, 58, 70, 111)

Response

To achieve the project's purpose and need of reintroducing the process of low-intensity surface fire, we will need to conduct prescribed burning. Alternatives 3 and 4 are partially in response to the issue of smoke, and will be considered in detail by the interdisciplinary team. The DEIS will contain an analysis of the potential health effects of smoke from the proposed prescribed burning.

A few commenters expressed concern that the smoke produced from the proposed prescribed burns will be inescapable and that this violated the due process clause (Fifth Amendment) in the U.S. Constitution.

The due process clause ensures that all levels of government operate within the law and provide fair procedures to citizens (Cornell University Law School 2012). The National Environmental Policy Act (NEPA) provides for due process. The public has opportunities to comment on actions and environmental analyses, appeal decisions, or litigate.

Other commenters were concerned that prescribed burning produces smoke that would harm residents of minority communities and people with disabilities, including those with asthma and cardio-pulmonary problems. They thought this would violate Section 504 of the Rehabilitation Act of 1973, which “...prohibits discrimination on the basis of disability in programs conducted by Federal agencies, in programs receiving Federal financial assistance, in Federal employment, and in the employment practices of Federal contractors,” (U.S. Dept. of Justice 2009). We will follow all requirements listed in the New Mexico State Smoke Management Regulations,

including coordination requirements with New Mexico Environmental Department's Air Quality Bureau. We will also notify potentially affected communities, other agencies, fire departments, and others in advance of and during the burn activities. The Jemez Ranger District will also contact those on its list of smoke-sensitive people.

As stated previously, we will address the potential effects of smoke in the DEIS, including "the environmental effects of the proposed action, including human health, economic and social effects on minority communities and low-income communities" as outlined in [Executive Order 12898](#).

Please see the responses to Issues 7, 31, 45, and 61, which also address prescribed burning.

Issue 31

Conducting prescribed burns on the scale proposed for this project – approximately 100,000 acres – will release carbon dioxide into the atmosphere and aggravate climate change. (Comments 16, 28, 34, 36, 45, 50, 57, 58, 70, 76)

Response

To achieve the project's purpose and need, some prescribed burning must take place. The DEIS will analyze and disclose the project's potential effects relative to climate change.

Please see the responses to Issues 7, 30, 45, and 61 which also address prescribed burning.

Issue 32

Cutting trees at the scale proposed will not stop catastrophic fires from occurring. Variable degrees of thinning need to be analyzed first, and even then, there is no way to know for sure that thinning on this scale will achieve the desired effects. (Comments 1, 3, 14, 36, 40, 41, 53, 60, 79, 112)

Response

The proposed idea of treating fewer acres or have varying degrees of thinning intensity would not meet the purpose and need of increasing ecosystem resiliency, restoring ecosystem structure and function, and reducing the potential for uncharacteristically severe wildfires.

The current proposal identifies less than 45 percent of the forest stands, not including grasslands, piñon-juniper woodlands, and other non-forested areas, for potential harvest. Additional thinning areas are included in the proposal to meet objectives such as facilitating prescribed burns, improving wildlife habitat, or providing firewood or other forest products. A complete analysis of the effects of thinning will be presented in the DEIS.

Most of the forest stands in the project area have at least 600 trees per acre on average, as compared to 15 to 56 trees per acre before the start of intensive settlement and resource extraction in the late 1800s (Covington and Moore 1994; Moore et al. 2000). These same dry forest stands existed until the late 1800s under a frequent surface-fire regime that supported a much lower range of tree densities.

Thinning for restoration and fuel reduction has been studied extensively. It is effective and has many ecological benefits. The [Ecological Restoration Institute's library](#) and the [Forest Service's Treearch website](#) have dozens of articles on the effectiveness and benefits of thinning, prescribed burning, and restoration in ponderosa pine forests.

Not all forested stands within the project area will be treated, and some dense stands will remain in the project area and throughout the Jemez Mountains. Applied treatments will be of varying types, intensities, location, and timing. Treatments are intended to achieve the following characteristics of a healthy ecosystem (Kolb et al. 1994): 1) resistance to or ability to recover from catastrophic change at the landscape level; 2) functional equilibrium between supply and demand of essential resources such as water, nutrients, growing space; and 3) diversity of seral stages and stand structures on the landscape.

Please see the response to Issues 11 and 49 and Concerns 1, 3, 44, and 48 regarding tree cutting.

Issue 45

Prescribed fires have too many negative consequences such as health effects, risk of escape, and climate change, to be used as a restoration tool at all. Only thinning should be used to restore the Jemez Mountains landscape. (Comments 1, 3, 6, 20, 27, 29, 30, 34, 36, 40, 43, 45, 49, 57, 58, 63, 68, 70, 82, 110)

Response

We considered developing treatment prescription that would not use prescribed fire in the project area. The interdisciplinary team eliminated this alternative from detailed analysis because it would not meet the purpose and need of the project. We cannot achieve the desired conditions without using prescribed fire.

To restore ecosystem structure and function in the dry forests of the Southwest Jemez, we need to use fire. Forest restoration can be achieved only when the dominant disturbance processes (wildland fires) are allowed to occur or are mimicked by using prescribed fire.

Fire is an essential and keystone process in the conifer forests of the Western United States (Weaver 1943, 1951; Covington et al. 1997; Arno and Allison-Bunnell 2002; Falk 2006). Cutting trees can create an open forest structure, but no mechanical means of fuel reduction—grazing, timber harvest, thinning, or biomass utilization—can duplicate the unique ecological effects of wildland fire, such as soil heating, nutrient cycling, and changes in community composition and structure (Leenhouts 1998).

The only known substitute for natural fires and their infinite number of effects on ecosystems is prescribed fire. Prescribed fire will be necessary to maintain or restore native ecosystems.

However, alternatives 3 and 4 were developed in response to this issue: 3) using prescribed fires in areas that have been mechanically treated; and 4) using prescribed fire in areas that have *not* been mechanically treated. Both alternatives 3 and 4 respond to the issues of smoke and the scale of prescribed burning.

Using mechanical and other treatments instead of prescribed fire has been studied thoroughly. The National Fire and Fire Surrogate Study (McIver et al. 2012) summarized the results of over

200 studies looking at the costs and ecological consequences of different fuel reduction treatments in dry forests. One of the general conclusions was that "...mechanical treatments do not serve as surrogates (replacements) for fire for the great majority of ecosystem components," (p. i). Mechanical treatments used with prescribed burning had effects similar to prescribed fire alone.

Other studies in western forests have found similar results: thinning and prescribed burning used together are more effective at reducing fuel, reducing extreme fire behavior, and restoring forest structure than thinning alone (Stephens 1998; Covington et al. 2001; Skov et al. 2004, 2005; Fajardo et al. 2007; Youngblood 2010; Fulé et al. 2012).

In addition, prescribed burning can be done safely. All prescribed fires on federal lands follow the [Interagency Prescribed Fire Planning and Implementation Procedures Guide](#). The guide provides standardized procedures for planning and implementing prescribed fire.

How do we ensure safety and prevent escaped fires? Before we light a prescribed fire we prepare a prescribed fire burn plan using the planning and implementation guide. The plan has several components:

- The environmental prescription has the wind, temperature, relative humidity, and fuel moisture values that will meet our resource objectives and reduce the probability of an escaped fire.
- The prescribed burn prescription defines the conditions when we can safely do a prescribed burn. If the conditions are not met, we will not burn.
- The complexity analysis rates the risk, potential consequences, and technical difficulty of each burn. The rating determines the number of personnel needed, their qualifications, and the resources (fire engines, drip torches, etc.) needed to implement the burn. If the required resources are not available, again, we will not burn.

Since 1996, Forest Service prescribed fire escapes have decreased from about 10 escapes per 1,000 fires ignited from 1996 to 2001, to an average of 2.5 escapes per 1,000 ignitions from 2003 to 2011. In the Southwestern Region (Arizona and New Mexico) there were no escaped fires during 2011 (112 burns, 78,700 acres burned).

This decrease is due to managerial factors such as the use of standardized burn plans, new training courses, use of spot weather forecasts during the burn, relief from drought conditions in some parts of the U.S., and continued reduction of fuel loads, especially in the Southeastern U.S.

Please see the responses to Issues 7, 30, 31, and 6, which also address prescribed burning.

Issue 49

Cutting trees over 9-inches diameter in Mexican spotted owl habitat violates the Endangered Species Act and has not been shown to preserve spotted owl habitat. (Comments 47, 58, 91, 108)

Response

The proposed action includes a project specific forest plan amendment to cut trees up to 24-inches diameter in Mexican spotted owl habitat in order to protect Mexican spotted owl. Cutting larger trees would reduce hazardous fuels, but more importantly, removing larger trees in certain

situations would improve ecological conditions. In protected activity centers, removing larger trees would improve spotted owl habitat by creating structural diversity. The project is designed to be in compliance with the Endangered Species Act, which will include consultation with the U.S. Fish and Wildlife Service (USFWS).

An alternative based on the revised Mexican spotted owl recovery plan was eliminated from detailed analysis because it would fail to meet the objectives set for protection of the Mexican spotted owl. In addition, the uncertainty at this time regarding the U.S. Fish and Wildlife Service revised recovery plan will make it difficult to create an alternative that is not arbitrary.

Effects to Mexican spotted owl habitat will be analyzed in detail and displayed in the DEIS and project record.

Please see Issue 11 about cutting large trees.

Issue 58

The environmental analysis must analyze and disclose the spatial extent of old-growth stands that meet forest plan criteria at each of the prescribed analysis scales. (Comment 91)

Response

We will use the forest plan criteria to analyze the spatial extent of old-growth stands. The effects of the proposed action and the alternatives on old growth will be analyzed and disclosed in the DEIS.

The commenter also raised a concern that old growth would be cut under the proposed action. The original proposed action did not state that old growth would be cut; however, the revised proposed action includes design criteria intended to meet the forest plan standards for old growth allocation. Please see the response to Issue 11 regarding cutting large trees.

Issue 61

The cumulative effects section must address activities that affect air quality. (Comment 28)

Response

Activities that affect air quality, such as prescribed fires, will be considered in cumulative effects.

Issue 62

The cumulative effects section must address livestock grazing and continued maintenance activities (tree cutting and prescribed burning). (Comments 28, 91)

Response

Managed livestock grazing and foreseeable maintenance activities will be carried forward as ongoing activities and will be considered in cumulative effects.

Issue 63

The Jemez Mountain Salamander is anticipated to be listed as an endangered species in the near future and the analysis needs to consider the best ways in which to protect the Salamander and its habitat.

Response

This issue, and an alternative, was developed in response to an internal discussion about the Jemez Mountains salamander. However, this alternative was eliminated from detailed analysis because it would fail to meet the purpose and need within a large portion of the landscape. In addition, the uncertainty at this time regarding the U.S. Fish and Wildlife Service stipulations for Jemez Mountains salamander will make it difficult to create an alternative that is not arbitrary.

Concerns That Will Not Be Addressed in Detail

The concerns raised will not be addressed in the DEIS for the reasons stated earlier. Comments that are not focused on the purpose and need of the proposed action, proposed alternatives, assessment of the environmental impacts of those alternatives, and proposed mitigation are beyond the scope of the environmental impact statement ([40 CFR 1508.25](#)).

Concern 1

Using the late 1800s as the reference condition for how the forests in the project area should look is arbitrary. Controversy exists as to what ponderosa pine forests historically looked like. (Comments 28, 34, 36, 40, 46, 57, 58, 70)

Response

The purpose of the restoration treatments is not to restore the area to a particular reference or historical condition, but rather to increase the resilience of the ecosystems in the project area. Reference conditions act as a baseline for evaluating current conditions, and they also guide the development of treatments (Fulé et al. 1997).

The basic premise of restoration ecology is that ecosystems function best in the conditions to which they adapted over time (Swanson 1994). Open forests, a grassy understory, and low-intensity surface fire are the key features of ponderosa pine forests. Thinning and burning treatments that move the Jemez ponderosa pine forests toward these conditions will increase resilience. The forests will be better equipped to handle disturbances, including climate change (Fulé 2008).

When we use reference conditions as a benchmark, we see that current ponderosa pine forests in the project area are very different from those conditions. We have good information about natural conditions in southwestern ponderosa pine forests because they have been studied intensively. There are numerous studies on the natural forest conditions and fire cycles specific to the Jemez Mountains (Allen 1989, 2001; Touchan et al. 1995, 1996; Allen et al. 1995; Touchan and Swetnam 1995; Swetnam and Baisan 1996). We will use these and other studies to evaluate current conditions and develop treatments.

For example, these area-specific studies show that these pine forests were less dense than they are today. Tree densities ranged from 26 to 47 trees per acre in northern New Mexico (Covington and

Moore 1994). Recent research has yielded slightly higher average densities of 65 trees per acre in Arizona (trees over 10 cm diameter) (Williams and Baker 2012). Today, the average tree density for similar sized (5-inches diameter) ponderosa pine in the project area is 178 trees per acre—nearly three times as many trees as the highest historical average. The situation is even worse for smaller trees (less than 5-inches diameter): the average is 537 trees per acre (RMRIS database, Santa Fe National Forest). Other benchmark conditions have changed as well: forest structure (size and arrangement of trees), species composition, canopy cover, understory vegetation, and fire cycle (USFS 2010).

Several commenters cited research regarding fire probabilities (Rhodes and Baker 2008), effective life of fuel reduction treatments (Agee and Skinner 2005), and historical tree densities, forest structure, and fire severity (Williams and Baker 2012; Platt et al. 2006). These studies and others will be reviewed for use in the specialists' reports and the effects analysis. Some of this research has also been addressed in other responses: Rhodes and Baker (2008) see response to Concern 57, and Agee and Skinner (2005), see response to Concerns 47 and 57.

Concern 3

The scale of the cutting and prescribed burning proposed is unprecedented in its size. The Forest Service has no evidence that the proposed action will meet the purpose and need. (Comments 5, 8, 12, 23, 27, 34, 45, 49, 52, 53, 74, 81, 83, 86, 110)

Response

The enabling legislation for Collaborative Forest Landscape Restoration projects is focused on treatment of landscapes. Using a landscape perspective is consistent with the Act and the [New Mexico Forest Restoration Principles](#). Landscape-scale treatment is also supported by the scientific community (Kauffman et al. 1997; Kauffman 2004; Agee and Skinner 2005; Noss et al. 2006).

Working at a landscape scale captures the complex relationships that exist at different levels in an ecosystem. Past treatments in the area were more narrowly focused on hazardous fuel reduction or single resource needs and conducted on small, disconnected parcels of land. This project integrates multiple ecosystem restoration needs across the landscape.

Land management agencies, conservation organizations, and researchers have recognized the need for landscape-scale treatments to restore the ecological functions and processes of damaged ecosystems. Doing this type of work at the landscape level is appropriate to the scale of the ecological problems and fire hazard found in our forests.

There are other landscape scale projects in the area and the region:

- Valles Caldera National Preserve is proposing to mechanically treat and prescribe burn nearly 22,000 acres and prescribed burn only on 28,000 acres;
- the Four Forest Restoration Initiative proposes to treat nearly 588,000 acres on the Coconino and Kaibab National Forests in Arizona;
- the Bluewater Ecosystem Project used thinning and burning on over 31,000 acres of the Cibola National Forest in New Mexico, and

- the Huachuca Firescape Project (Coronado National Forest, Arizona) uses thinning and burning treatments to address fuel conditions across 400,000 acres on National Forest, National Park Service, and Department of Defense lands.

Land management agencies, conservation organizations, and researchers have recognized the need for landscape-scale treatments to restore the ecological functions and processes of damaged ecosystems.

The types of treatments that we have proposed have been proven effective. Thinning and burning treatments are effective at reducing fuels and affecting fire behavior (Stephens 1998; Pollett and Omi 2002; Cram 2006; Lowe 2006; Roccaforte et al. 2008; McIver 2012; Safford et al. 2012).

These same treatments are also effective at restoring forest structure (Covington et al. 2001; Griffis et al. 2001; Waltz et al. 2003; Falk 2006; Abella et al. 2007; Harrod et al. 2009; Youngblood 2010).

Restoration treatments such as we have proposed also benefit wildlife habitat and meadows (Lee and Irwin 2005; Converse et al. 2006; Gottfried and Ffolliott 2009; Kalies et al. 2010; Halpern et al. 2012) and hydrological resources (Kaye et al. 1999; Woods et al. 2006; Troendle et al. 2010).

Concern 4

Please notify the Navajo Nation if habitation sites, plant gathering areas, human remains, and objects of cultural patrimony are found during work activities. (Comment 15)

Response

The Forest Service will follow our standard consultation protocol (Region 3 First Amended Programmatic Agreement [Appendix J, Section 13]) in the event of an inadvertent discovery situation. Specifically, if any previously unidentified cultural materials are discovered during the implementation of the project, all work will cease and the forest archaeologist will be notified. Previously unrecorded properties will be documented and protected in the same manner as other properties. If human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered, we will follow the provisions of Native American Graves Repatriation and Protection Act (NAGPRA) (25 USC 3002[d]) and NAGPRA regulations (43 CFR 10).

We would be happy to meet with you to discuss the project in more detail and to discuss ideas on how to best protect your traditional uses of the area.

Concern 5

The Forest Service needs to create a board consisting of citizens, interested organizations, and others. The board would then oversee the project and suggest changes. (Comments 3, 16)

Response

This project stems from the Southwest Jemez Mountains [Landscape Strategy](#), which was collaboratively developed by a group of over 40 stakeholders, including agencies organizations, and communities. The Nature Conservancy, the New Mexico Forest and Watershed Restoration Institute, Pueblo of Jemez, Valles Caldera National Preserve, and the Forest Service jointly led the collaborative effort that resulted in the strategy. Other participating partners wrote [letters of](#)

[support](#) for the strategy, including WildEarth Guardians, Forest Guild, Santa Clara Pueblo, and the New Mexico Game and Fish Department.

This involvement was required by the legislation that established the Collaborative Forest Landscape Restoration Program, Title IV of the Omnibus Public Land Management Act of 2009. This law states that “a collaborative forest landscape restoration proposal shall... be developed and implemented through a collaborative process that—includes multiple interested persons representing diverse interests; and is transparent and nonexclusive; or meets the requirements for a resource advisory committee under subsections (c) through (f) of section 205 of Public Law 106-393 (16 U.S.C. 500 note).”

The Forest Service will continue to engage the public during the planning process. We have also hired a full-time partnership coordinator who will focus exclusively on working with our partners and matching volunteers with projects.

Concern 8

The Collaborative Forest Landscape Restoration Program, the funding source for the project, covers lands and projects under the jurisdiction of multiple agencies; however, the Santa Fe National Forest is proposing to prepare only one environmental impact statement covering only this project. The Forest Service should have developed one environmental impact statement for all Collaborative Forest Landscape Restoration Program projects in the nation. Because it isn't, the entire project violates the National Environmental Policy Act. (Comments 28, 36, 57, 58, 70)

Response

The Collaborative Forest Landscape Restoration Program (CFLRP) was developed to fund restoration projects throughout the country. The program provides guidelines and rules which the Forest Service must comply with in order to receive funding, but does not mandate that any projects be carried out. The purpose of the CFLRP is to encourage the collaborative, science-based ecosystem restoration of priority forest landscapes.

Projects selected for funding are separate and distinct. Thus, since no project is guaranteed under the CFLRP and each project is separate and distinct, there is no reason to measure cumulative effects of all projects approved under the CFLRP. One environmental impact statement for all CFLRP projects in the nation cannot be prepared. Conducting environmental analyses for projects in different ecosystems in different areas of the country is not segmentation (separation of a project into smaller parts). The actions covered under our proposal, and those of other CFLRP projects are independent of each other.

Moreover, although the objective of the Southwest Jemez Mountains CFLRP is to complete landscape restoration across multiple jurisdictions, this is not equivalent to having a connected action. The Council on Environmental Quality (CEQ) regulations consider actions connected if they: “(i) Automatically trigger other actions which may require environmental impact statements. (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously. (iii) Are interdependent parts of a larger action and depend on the larger action for their justification” (40 CFR 1508.25(a)(1)(i)–(iii)).

Furthermore, Council of Environmental Quality regulations only require other agencies to cooperate in the NEPA process upon the request of the lead agency or upon the request of the

potential cooperating agency. There is no requirement to involve agencies based on proximity (40 CFR 1501.6).

One commenter suggested combining this environmental impact statement with the one for invasive plant control because they are connected actions. Treatments for control of invasive plants are addressed in the Environmental Impact Statement for Invasive Plant Control Project for the Santa Fe and Carson National Forests. These two projects are not connected actions because they do not meet the criteria listed above.

Finally, one commenter thought that this project violated the Healthy Forests Restoration Act because it would contribute to exceeding the acreage limits for fuel reduction projects as outlined in the Act. This is not a Healthy Forests Restoration Act project; this project is authorized under the Collaborative Forest Landscape Restoration Program. The conditions and acreage limits under that act do not apply to this project, and a programmatic environmental impact statement is not required.

Concern 9

Cutting trees up to 24-inches diameter is not consistent with the Omnibus Public Land Management Act of 2009, the law that authorized the Collaborative Forest Landscape Restoration Program, which allows for the removal of small diameter trees only. (Comments 47, 57, 58)

Response

[Title IV of the Omnibus Public Land Management Act](#) authorized the Collaborative Landscape Restoration Program (CFLRP). This is a competitive program that awards funding to the top landscape restoration proposals nationwide. Proposals had to meet specific guidelines outlined in the Act and further clarified in the Forest Service’s application instructions.

The act does not limit tree-cutting to *only* “small diameter trees,” and does not state an upper diameter limit. Sec. 4003 c(1)(E) lists the eligibility criteria for proposals, favoring those that would carry out any forest restoration treatments that reduce hazardous fuels by:

(i) *focusing on small diameter trees*, thinning, strategic fuel breaks, and fire use to modify fire behavior, as measured by the projected reduction of uncharacteristically severe wildfire effects for the forest type (such as adverse soil impacts, tree mortality or other impacts...

Some commenters thought that the proposed action did not meet CFLRP guidelines for social and economic sustainability. These topics were addressed in the CFLRP proposal. The Secretary of Agriculture selected the Southwest Jemez Mountains Landscape Restoration proposal in the first round of grant awards in 2010. Receiving the grant award is a strong indicator that our proposal was consistent with the guidelines of the act, including “encourage[ing] ecological, economic, and social sustainability,” (Sec. 4001(1) and demonstrating how “the use of forest restoration byproducts can offset treatment costs while benefitting local rural economies and improving forest health,” (Sec. 4001(4)B. The [Landscape Strategy](#) explains how the project promotes ecological sustainability and promotes forest health.

Other commenters referred to the Organic Act (Forest Service Charter) and the Endangered Species Act. Please see responses to Concern 52 and Issue 49, respectively.

Concern 12

This proposal is largely a commercial enterprise that benefits commercial loggers, not local forest products businesses and other local businesses. Work or products generated by the proposed action should go primarily to local individuals, contractors, and companies. (Comments 3, 4, 10, 20, 22, 23, 33, 51, 60, 85)

Response

Yes, this project has a commercial component involving removal of forest products. The enabling legislation (Title IV of the Omnibus Lands Act, PL 111-11) authorizes the use of forest restoration by-products to offset treatment costs, and we will do so. Wood harvest may occur on up to 39,900 acres. Restoration treatments are designed to meet ecosystem objectives and not to maximize wood product outputs; however, there will be an ample supply of wood by-products available to meet social and economic needs. Utilizing wood from this area will reduce the amount of wood that needs to be burned, thereby reducing smoke production and prescribed burning costs.

Estimated costs for thinning, wood removal, and slash disposal are \$620 per acre. Slash disposal by burning averages \$130 per acre. Proposed wood utilization from this landscape and surrounding land could significantly reduce treatment costs while supporting a wide variety of businesses, provide new jobs, and stimulate the economies of local rural communities in the Jemez Mountains area.

Potential wood products include firewood, biomass for energy, milled and preserved lumber, posts, poles, latillas, vigas, wood containers and pallets, engineered and prefabricated wood products, and landscaping materials (bark, mulch).

There is no large commercial wood products industry within the working area of the Southwest Jemez Mountains project and the existing businesses and personal use markets cannot currently use all of the projected wood supply. The Santa Fe National Forest has and will continue to network with potential wood products businesses, including local businesses. A long term supply of wood products is critical to successful wood products businesses and the forest intends to make the supply available under a long-term (up to 10 years) stewardship contract offering.

Some local and non-local businesses have expressed interest in a long-term contract. Other businesses have expressed interest in any timber contracting opportunities. Recent investments by local businesses are increasing the potential value for small diameter forest products that may help offset treatment costs. There is no guarantee that contracts will be awarded to local operators, although a long-term contract is less likely to rely on outside labor than a short-term contract.

There were other comments about supervision of logging contractors, costs, and treatment methods. All Forest Service contracts for thinning and/or harvesting have on-site Forest Service contract administrators to ensure that all contract requirements are followed, regardless of who the contractor is or where they come from.

The cost of forest treatment contracts varies depending on the intensity of treatment, the requirements for disposing of wood waste (fuels), the value (if any) of the woody material being cut, and the terrain. Taxpayers pay for most of the cost of these treatments, and the lower the

value in the woody materials, the higher the cost. Small diameter wood does not have a lot of value; it often costs more to remove small trees from the forest than they are worth on the market.

The methods used for these treatments will vary and depend on the specific treatment type, the treatment area, and the contractor's preference. The Forest Service does not typically specify exactly how the work is to be done, but specifies exactly the result to be achieved. In many cases, using machinery is far safer, more efficient, and less expensive than using chainsaws or other manual methods. In other cases, hand crews are a contractor's preferred method of treatment.

Concern 13

The proposed action does not give enough information about some of the activities in the proposed action. (Comments 7, 24, 27, 28, 30, 70, 99)

Response

Details about most of these activities will be provided in the environmental impact statement. Brief replies are given here; details may change as the analysis goes forward.

How slash will be treated and by when: Slash treatment by burning would take place within 1 to 2 years and is dependent on weather. We would dispose of activity slash in certain locations within 1 year to meet forest plan standards and guidelines for scenery. Areas set aside for fuelwood gathering may take several years to clean up.

How leave trees would be protected in prescribed burns: We cannot protect all trees from damage or death during a prescribed fire. We do, however, want to protect certain types of trees or structures, including old and large trees (>16-inches diameter), standing dead trees (snags), large down logs, and large stumps. To protect these features, we would remove fuel or construct control lines around large down logs, stumps and standing live and dead trees, or control the intensity of the burn by modifying the ignition and prescription.

How riparian and wildlife projects tie into prescribed burning and tree cutting: Some silviculture treatments, such as aspen regeneration and meadow restoration, are specifically designed to improve wildlife habitat. Riparian projects are focused on improving or enhancing terrestrial and aquatic habitat and water quality. Silviculture and prescribed fire treatments in mixed conifer habitat will enhance habitat for (and avoid adverse impacts to) the Mexican spotted owl and Jemez Mountains salamander. Treatments would improve habitat for northern goshawk and other species associated with ponderosa pine ecosystems.

Other silviculture and burning treatments are designed to reduce excess tree densities and fuels, treat thinning slash (tree tops, branches), and restore forest structure. These treatments have the side benefit of improving wildlife habitat. Reducing tree density will increase understory plant diversity and abundance, which in turn, results in improved habitat for birds and small mammals. A diverse forest structure (trees of different ages and sizes), snags, and large down logs would provide more nesting, roosting, and sheltering habitat.

Specific locations for the projects: Treatments would occur throughout the analysis area. Draft maps showing the proposed locations of thinning, prescribed fire, stream, and riparian treatments can be found on the [project website](#) under Proposed Action.

Purpose of enclosure fences: Enclosure fences are designed to limit or prevent access by livestock, wildlife, people, or vehicles to areas we want to protect, such as riparian areas and large meadow habitats. Enclosures protect and promote growth of vegetation and protect streambanks from trampling.

Which areas would be thinned: Thinning will focus on ponderosa pine and dry mixed conifer forests and on breaking up the large areas of continuous, dense forest and reducing excess tree densities and ladder fuels. Potential treatment areas are shown on [draft maps](#) found on the project website under Proposed Action.

How old growth would be increased: We are proposing treatments specifically designed to enhance or maintain old growth characteristics. Treatments are designed to keep large trees, down logs, and snags on the landscape and to retain thick-barked, fire-resistant species.

How the work will be funded: The cost is expected to be funded from the USDA-CFLR Program (approximately 50 percent) and the rest from regular appropriated funds, various grants, and service contributions from partner agencies. The thinning costs will be offset to some degree by the value of the wood removed.

Elk and cattle populations: The New Mexico Game and Fish Department conducts population counts of wildlife. The [Southwest Jemez Mountains Landscape Assessment Report](#) states that “Elk numbers were estimated in 2007 and 2008 (pre-season) to be 5,500 to 8,000 in Game Units A, B (Preserve), and C (National Forest),” (p. 112). There are 8 active livestock grazing allotments within the project area and 1,205 permitted head of livestock.

Beaver habitat conditions: Beaver ponds are present on the Jemez River, East Fork Jemez, Rio Cebolla, San Antonio Creek, and Rio Guadalupe. A habitat factor that limits beaver populations is the availability of food sources such as aspen and will that sustain long-term populations. Creating new areas of aspen is part of the proposed action.

Establishment of defensible firelines: We would not create fuelbreaks or firelines around communities to protect communities or structures. We would build firelines along the perimeter of a prescribed burn, in some cases, to further improve the safety and effectiveness of burn area boundaries.

Concern 15

The Forest Service should not use herbicides to treat nonnative invasive plants. (Comments 23, 27, 34, 36, 40, 53, 108)

Response

The use of herbicides to treat nonnative invasive plants is not part of the proposed action, so this concern is beyond the scope of the project.

Use of herbicides to treat nonnative invasive plants will be addressed in the Supplement to the Final Environmental Impact Statement for the Invasive Plant Control Project, Santa Fe and Carson National Forests.

Concern 16

We received letters requesting that we consider additional treatments or actions. (Comments 17, 19, 20, 28, 33, 36, 40, 70, 99, 102)

Response

These activities are beyond the scope of the proposal:

- **Greatly reduce or eliminate logging, grazing, and mining:** These are managed activities and are allowed on federal lands by law, regulation, and policy.
- **Reintroduce wolves:** Reintroduction of wolves is handled by the U.S. Fish and Wildlife Service.
- **Restore the Las Conchas burn area, including road access to private lands:** The Las Conchas burn lies outside the project areas and the CFRL funding authorized for this project for this project does not cover post-wildfire rehabilitation.
- **Address impacts of the Santa Fe watershed proposal on climate change:** The commenter is referring to a different project.
- **Monitor potential beaver population over time and consider potential property damage:** The New Mexico Game and Fish Department monitors wildlife populations and also handles depredation and nuisance wildlife complaints.
- **Please include and evaluate State of the Southern Rockies (Southwest Wildlands Initiative, 1998) together with other landscape assessments.** We used several assessments in the development of the Landscape Strategy and Landscape Assessment. The commenter references an eco-regional report. The author suggests an evaluation of the proposed action within the context of this much larger eco-regional area. The DEIS will disclose effects, should there be any, within this much larger context.

Concern 17

We received comments from agencies and individuals expressing support for, or no comment on, the proposed action. (Comments 11, 15, 18, 19, 21, 30, 31, 44, 51, 56, 59, 78, 88, 89, 95, 96, 97, 98, 103, 105, 108)

Response

We appreciate your interest, involvement, and support.

Concern 18

We received comments and suggestions that have been addressed or answered elsewhere. (Comments 21, 26, 27, 65, 67, 80, 84, 94)

Response

The following comments have been addressed:

- **Accessing materials on the website:** The problems with the website have been fixed.

- **Comment period:** The wording regarding the comment period was corrected.
- **Have Forest Service personnel in the field during logging operations:** This is a standard practice included in contracts.
- **Reducing nonnative invasive plants:** This is addressed in the Supplement to the Final Environmental Impact Statement for the Invasive Plant Control Project, Santa Fe and Carson National Forests.
- **Volunteer activities:** The partnership coordinator or the Jemez District office can assist with this.

Concern 22

The Forest Service should use an adaptive approach on this restoration project to allow for the incorporation of new science and changing conditions. (Comments 31, 76)

Response

The approach suggested by the commenter is called adaptive management. The use of adaptive management is an integral part of the proposed action and is introduced on page 11 of the [proposed action](#) in the section “How will forest staff decide exactly where and how to treat.” This approach will be explained in greater detail in the DEIS.

Concern 23

The location of fuels treatments should incorporate forest type, location, topography, adjacency to other treatment areas, fire hazard, and the future use of wildland fires. (Comment 91)

Response

The implementation plans for any prescribed burns will address factors such as topography, forest type, and others. The effects on the environment of both prescribed burning and the use of wildland fires will be addressed in the DEIS. Please see the response to Issue 45 for more information on planning for prescribed burns.

Concern 27

The Landscape Assessment (USFS 2010) is cited as describing existing resource conditions in the project area. Some of the information in that document is not correct or uses research conducted in other ecosystem types. Please review or update the information to reflect useful, current science before incorporating this material in the environmental impact statement. (Comment 30)

Response

Thank you for bringing that to our attention. We will update the description of the existing condition and the science used.

Concern 29

Treatment of aspen is not needed because they will regenerate naturally or be created by future disturbances. (Comments 20, 27, 30)

Response

Aspen stands make up about 1.3 percent of the project area; however, aspen trees are present everywhere that we propose to treat. Aspen stands are indeed created through natural disturbances, i.e. high-severity fires, but we cannot wait for that type of event to occur. We need to re-create those conditions aspen would face after a natural fire by using mechanical thinning and prescribed fires. Such treatments can help increase resilience in aspen

Concern 33

The proposal's focus on landscape-scale treatments ignores the more viable alternative of treating around communities to protect them from high-severity wildfire. (Comment 28)

Response

The purpose of the Collaborative Forest Landscape Restoration Program is to “encourage the collaborative, science-based ecosystem restoration of priority forest landscapes...” Focusing treatments to reduce risk of fire to communities does not meet the intent of the program. The legislation that established this program also calls for reestablishing natural fire regimes where appropriate. We think that this is appropriate given the frequent fire ecosystems of the dry forests in this area.

One objective of the project is to restore the process and function of wildfire in the ecosystem, which includes allowing wildfires to burn in current and future climate conditions. However, fires such as Las Conchas demonstrate that current forests are highly susceptible to burning at severities that are undesirable both socially and ecologically, and far outside the natural fire regime to which these dry forests are adapted. Proposed restoration treatments are intended to move the forest toward conditions that enable us to allow wildfires to burn with effects that are beneficial to the ecosystem and minimize social consequences.

Concern 35

Some side effects of the proposed action could result in fewer trees surviving than we can expect. Cutting trees often spreads root disease among the remaining trees. The slash associated with cutting trees attracts bark beetles. Studies show that climate change is likely to cause trees to die. (Comments 30, 70, 111, 112)

Response

The climate in the Southwest is predicted to get hotter and drier. Forests that are overstocked could have significant tree mortality (death) because trees are competing for a limited water supply. Thinning, however, reduces competition between trees and gives them a greater chance of survival.

We consider insect and disease when planning silvicultural treatments; however, it is not a serious enough problem to keep us from implementing treatments. All areas planned for cutting will be walked through by a silviculturist or other forester with education and training that includes insects and diseases common to the region. If concerns are identified, we would take action to minimize risks such as timing cutting activities around bark beetle life cycles or avoiding areas of disease to prevent spread.

Root diseases are naturally occurring parts of forest ecosystems in the Southwest and are tied to particular sites because the fungi live in the soil. Timber harvest can increase the root disease activity, but infected areas are typically less than one acre (Fairweather et al. 2006).

Root diseases are usually species specific; other tree species can take the place of trees killed by the root disease. These new trees won't be affected by the root disease. Trees killed by root diseases (or insect attacks) have a function in the forest. These dead trees create canopy gaps that allow shrubs or hardwoods to grow. Dead trees (snags) also become wildlife habitat. Treatments can help control root disease. In ponderosa pine, thinning has been shown to lower the mortality of the remaining trees from root diseases (Tappeiner et al. 2007).

For bark beetles, we use standard mitigation measures to reduce their spread; these measures will be listed in the environmental impact statement. One of the most common measures is to remove or chip slash larger than 4-inches diameter within 30 days, if it is created during beetle flight season (January through June) ([DeGomez 2008](#)).

Concern 36

Planning and implementation need to be done in consultation and coordination with affected grazing permittees throughout the process to minimize impacts to grazing management. (Comments 59, 93)

Response

The Forest Service will continue to work with permitted livestock owners in advance of projects to make necessary adjustments to grazing management. For the Southwest Jemez project, we have hired implementation and partnership coordinators who will focus entirely on working with the public, including permittees. All stakeholders will have more opportunities to participate and comment as we progress from scoping to the final environmental impact statement.

The Forest Service has adopted an adaptive management strategy that has been incorporated into environmental assessments that authorize grazing on National Forest System lands. The adaptive management strategy allows the Forest Service to build flexibility into allotment management and allows for decisions that are responsive to needed adjustments in permitted actions (Forest Service Handbook 2209.13).

It is Forest Service policy to contribute to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (FSM 2202.1).

One of the forestwide goals in the Santa Fe National Forest Plan states the forest will "Manage Forest activities and programs within the capacity of the land while recognizing the value of maintaining the traditional cultures of northern New Mexico," (p. 22). The effects analysis in the environmental impact statement would disclose both environmental and socioeconomic effects of the restoration treatments, including effects on human health communities.

In addition, Presidential Executive Order 12898 requires Federal agencies to respond to the issue of environmental justice by "identifying and addressing disproportionately high and adverse human activities on minority and low income populations." The effects of the proposed

management activities are to encompass both human health and environmental effects, and are to include the cumulative and indirect effects on a community.

Please see the response to Concern 38 below.

Concern 38

Grazing on national forest land results in damage to the forests and riparian areas. As a permitted activity, grazing does not bring in enough money to repair the damage it causes, so it should be eliminated. (Comments 5, 20, 21, 27, 33)

Response

Restricting the amount of grazing, or otherwise modifying grazing management, is outside of the scope of this project. Changes in numbers of livestock or grazing rotations are not part of this proposal. Grazing is an ongoing activity that would continue within the capabilities of the allotment and would not result in adverse impacts to environmental resources and the socio-economic conditions to ranching communities in Sandoval County.

The project does, however, include ways which manage some aspects of livestock grazing, such as fencing out certain areas and developing water sources in the uplands to draw livestock away from riparian areas. More information will be provided in the environmental impact statement.

Please see the response to Concern 36 above, particularly the sections that address Forest Service policy and forest plan goals regarding grazing.

Concern 39

The Forest Service needs to work with private landowners to create defensible space around their property. This will then help prevent wildfire on National Forest System lands. (Comments 3, 92)

Response

Creating defensible space and similar activities on private land are handled by [New Mexico State Forestry](#). They offer technical assistance to individuals and communities interested in preventing and preparing for wildfire.

Concern 40

The proposed changes in the road system are unfair. (Comments 7, 19, 54, 62)

Response

These comments are directed to changes addressed in the final impact statement for Travel Management, and are therefore outside the scope of this project.

Concern 41

The Forest Service is limiting access to hunting and fishing by closing roads to motorized use. The hunting and fishing regulations are not fair. (Comment 7)

Response

Hunting and fishing regulations are established and administered by the State of New Mexico. The comment also refers to the recently approved travel management plan (see response to Concern 40). These topics are outside the scope of the proposed action.

Concern 42

The proposed action fails to comply with the forest plan, which requires monitoring of spotted owl populations. (Comment 91)

Response

The project is designed to comply with the monitoring guidelines in the forest plan (pp. 1996-5 to 1996-6) for project-level activities.

Concern 43

The proposed actions of prescribed burning and cutting trees will have detrimental impacts to the plants, birds, and animals that over the last 100 years have evolved to survive in the present environment. (Comment 45)

Response

The purpose and need of the project is designed to address ecosystem resilience across the landscape. In a resilient landscape, plant, bird, and animal species can respond to changing conditions in the environment over time. The environmental impact statement will disclose the effects of the thinning and prescribed burning treatments on wildlife and plants.

Concern 44

Defining ponderosa pines trees as weeds, proposing to remove 95 percent of them, and turning the forests into meadows is unnatural and will destroy the forest. (Comments 6, 16, 17, 27, 42, 66, 71)

Response

The Forest Service does not intend to remove 90 to 95 percent of the ponderosa pine throughout the Jemez Mountains, although in some stands it may be appropriate. Comparing the ponderosa pine tree to a weed was an analogy; it illustrates the point that there are too many ponderosa pine trees and they have thrown the forest conditions “out of whack”.

We are not proposing clearcutting or turning the whole area into meadows. We are proposing to return the forest to a natural, healthy condition and to restore existing meadows. Currently, there are so many trees that they are stressed and susceptible to insect and disease attack and vulnerable to intense fires. Many trees are dying. Trees are encroaching into meadow ecosystems and meadows are shrinking in size.

Our proposal involves thinning in areas where trees are overly dense so that the remaining trees will continue to grow and be vigorous and healthy. The treatments are supported and guided by a

large body of scientific research. Much of the research on restoration of ponderosa pine forests can be found on the [Ecological Restoration Institute website](#).

Meadows are a distinct ecological feature of the Southwest Jemez Mountains. It is our goal to restore and maintain those meadows. Soil samples show that historically 40 to 50 percent of the Southwest Jemez Mountains were once much more open with widely trees and meadows. Restoring more open conditions will help retain the unique ecological condition of the area. To restore those meadows to their natural state requires the removal of encroaching trees, including ponderosa pine. The Santa Fe National Forest does not intend to turn the entire forested area of the Southwest Jemez Mountains into meadows. The area is already home to numerous natural meadows. Without the proposed restoration work, it is likely that naturally occurring meadows would become fewer and smaller as trees continue to invade and fill up the meadow.

Concern 46

Prescribed fires are generally lit in the fall, when the risk of escape is lowest. Lighting fires during the fall places great stress on wildlife by forcing them to leave the area and destroying vegetative food sources needed for the winter months. (Comment 49)

Response

The fire history of the area shows that fires burned from spring through fall, with most occurring April to September (Touchan et al. 1996; USFS 2010). The Guacamalla Fire, for example, was started by lightning in mid-August 2011 and burned to the end of October. Prescribed burning is usually done in the fall because, as the commenter said, the risk of an escaped fire is lowest.

The native wildlife species in the area have experienced fires over many generations; they have adapted to fire and the changes it creates. Prescribed burning has positive and negative effects on wildlife in any season. For example, burning in the spring would place stress on animals that are breeding or raising their young. In the fall, many animals are dispersing and “leaving the nest” or migrating to winter ranges, and a fire may not be as disruptive.

These activities—breeding, raising young, dispersal, and prescribed burning—take place across a large area. A prescribed burn in the fall would affect a relatively small part of the landscape and wildlife populations. Overall, we expect the restoration treatments to improve foraging and nesting habitat for many wildlife species. Fire improves the growth of forage plants (grasses, forbs, and shrubs) by creating openings in the canopy. More sunlight and moisture reach the forest floor and understory plants show increased growth. Fires also create snags and downed logs, which are important habitat for birds and small mammals. The thinning and burning treatments would also significantly reduce the risk of losing forested habitat in a high-severity fire. Effects to wildlife will be analyzed in detail in the DEIS.

Please see the response to Issue 14, which also addresses wildlife and habitat.

Concern 47

The use of prescribed fire will not achieve the purpose and need because the forest in the Jemez Mountains is too far departed from the conditions that supported low-intensity fires. The Forest Service won't be able to re-create those conditions. (Comment 49)

Response

The proposed action would use prescribed burning in combination with tree cutting to restore forest ecosystems. These treatments would allow us to achieve the changes in ponderosa pine structure that would support low-intensity fires. In stands that are too dense to support low-intensity surface fire, thinning can be used to reduce tree densities and/or create structural conditions that support fire. Experimental treatments, evidence from wildfires and on-the-ground management activities, and modeling have shown that thinning and burning treatments work. They restore forest structure and function, thus creating conditions that support low-intensity surface fires in fire-dependent forests (Covington et al. 2001; Allen et al. 2002; Agee and Skinner 2005; Harrod et al. 2007; Fulé et al. 2012).

Concern 48

Opening the forest canopy by cutting trees increases fireline intensity, reduces fuel moisture, and increases mid-flame wind speed. Closed canopies cool the ground, hold moisture, and prevent evaporation and erosion. (Comments 20, 28, 40, 45, 49, 70, 76)

Response

Thinning stands to reduce density and create openings of different sizes reduces the amount of fuel and the risk of severe wildfires. The intensity of a fire is affected by weather, fuels, and topography, among other factors. The effects analysis in the environmental impact statement will disclose the effects of the thinning and prescribed burning treatments on fire risk.

The relationship between wind speed and fuel conditions help determine the crown fire hazard. When there are a lot of fuels, a relatively low wind speed is needed to take a fire from the surface into the crowns of the trees. When the fuel load is reduced, the wind speed needed to start a crown fire increases.

Closed canopies have more vegetative surface area that intercepts or captures more rain and snow. This water then evaporates and returns to the atmosphere instead of being absorbed into the ground. Also, a functional grass component will hold more moisture and prevent erosion (Ffolliott et al. 1989; Baker and Ffolliott 1999).

Concern 50

The Forest Service must comply with New Mexico Smoke Management Regulation 20.2.65 that allows only "untreated wood" and uncontaminated vegetation to be burned. To determine whether vegetation in the project area meets this requirement, the Forest Service must analyze representative woody material, leaves, and soil for chemical contaminants. The Forest Service should also disclose and analyze all products, ingredients, and chemicals used in igniting fires and evaluate their potential environmental and health impacts. (Comment 28)

Response

We will follow all requirements listed in the New Mexico State Smoke Management Regulations, including coordination requirements with New Mexico Environmental Department's Air Quality Bureau.

We are burning vegetative materials as defined in Regulation 20.2.65: “Vegetative material means untreated wood and untreated wood products, including tree stumps, (whole or chipped), trees, tree limbs (whole or chipped), bark, sawdust, chips, scraps, slabs, millings, shavings, grass, grass clippings, leaves, conifer needles, bushes, shrubs, clippings from bushes and shrubs, and agricultural plant residue.”

The vegetation in the area meets this definition. Regulation 20.2.65 has no requirement that vegetative material be tested for chemical contaminants before burning. Auxiliary fuel or incendiary devices, such as aerial ignition devices and diesel fuel used in drip torches, would be used to start the prescribed burns. Under the smoke management regulations, these devices can be burned in prescribed fires (NMR 20.2.65.101).

The effects of burning, including smoke emissions and products used to ignite burns, will be disclosed in the DEIS.

Please see the responses to Issues 7, 30, and 31 and Concern 56, which also address prescribed burning.

Concern 51

Cutting trees in the riparian area violates the riparian protection standards in the Santa Fe National Forest Plan. (Comment 28)

Response

The proposed activities are consistent with the forest plan. In the forest plan, riparian area management, standards and guidelines are addressed on pages 20, 73, 79 to 80, and 106. There are no explicit prohibitions regarding tree-cutting in riparian areas (p. 79).

Restoration treatments in riparian areas will be done in accordance with the [Clean Water Act](#), as amended (1972), [Executive Order 11990](#) (Protection of Wetlands), and Forest Service Manual 2526, Riparian Area Management.

Concern 52

Removing 95 percent of the trees is not consistent with the Forest Service charter (16 U.S.C. § 475) because it won't provide a continuous supply of timber or secure favorable conditions of water flows. (Comment 58)

Response

The Organic Act of 1897 (Forest Service Charter) specified the uses for which forest reserves might be established and provided for their protection and administration. This act is the basis for the management of national forests. The Multiple-Use – Sustained-Yield Act of 1960 (MUSY) gave other resources (outdoor recreation, fish, wildlife, water, timber, and range) priority in national forest planning along with those first listed in the Organic Act. Other laws have since added wilderness and heritage resources.

The proposed activities are consistent with the Organic Act and other law, policy, and regulation. For example, thinning the excess trees protects the forest and other resources by reducing fire risk

and improves the forest because the remaining trees are released and their growth and health improve. Thinning also increases the diversity and amount of understory plants, thus improving and increasing wildlife shelter and foraging habitat, thus supporting the Act

Further, a continuous supply of timber does not need to be produced from these 110,000 acres; it can be provided by all of the national forests. In fact, requiring that the project area provide a continuous supply of timber can be seen as violating the Act and related legislation because other resources would not be considered in planning efforts.

Concern 53

The proposed action violates the Migratory Bird Treaty Act. (Comment 70)

Response

Federal agencies have a responsibility to protect migratory birds. These responsibilities are outlined in [Executive Order 13186](#), signed by President Clinton. The order requires agencies to incorporate conservation measures for migratory birds into their activities and enter into a Memorandum of Understanding with the U.S. Fish and Wildlife Service. The Forest Service's [memorandum](#), signed in 2008, focuses on promoting conservation of birds and on avoiding or minimizing adverse impacts to migratory birds. It does not authorize the take of migratory birds and does not remove our legal requirements under the act and similar laws.

The analysis in the environmental impact statement will follow agency protocols for evaluating effects to migratory birds, pursuant to state and federal laws, regulations, and executive orders. We will disclose the effects of our proposed actions on migratory birds and identify and implement measures that minimize unintentional take as a result of our activities.

Concern 54

High-intensity wildfires in the Santa Fe National Forest are all human caused. What is needed is some effective modification of human behavior to control fire, not the proposed tree cutting and prescribed burning. (Comments 27, 49)

Response

The modification of human behavior regarding fire prevention is outside the scope of this project. The Forest Service has ongoing programs that address [fire prevention and education](#).

Concern 55

Aggressive clearing of piñon-juniper woodlands to conditions that existed in the late 1800s is not ecologically warranted or desirable. Persistent woodlands show little evidence of past fire, other than small fires that produce no significant change in stand structure. (Comment 28)

Response

“Aggressive clearing” of piñon/juniper woodlands is not proposed in this project. Few treatments would occur in piñon-juniper; work would occur on no more than 1,000 acres. We would

prioritize areas for treatment to reduce erosion, protect heritage sites, or to increase habitat for songbirds. Other aspects of treatments in piñon-juniper are:

- desired residual tree densities are between 5 to 25 trees per acre;
- favor piñon or large junipers (16" diameter at root collar) as leave trees;
- firewood may be gathered where roads allow;
- scatter slash to provide ground cover or pile and burn; and
- no broadcast burning.

Concern 56

The environmental impact statement should estimate the amount of mercury that will be released into the atmosphere from the proposed prescribed burning. Mercury is a toxin that can negatively impact human health. (Comment 36)

Response

There are two potential sources of mercury in the project area. The first source of mercury is present in the parent material of bedrock in soils throughout the west. In forest soils this mercury is tightly bound to the organic matter of the soil. This organic matter is largely unaffected by prescribed burning but is greatly affected during wildfires. This is supported by preliminary research.

The second source would be mercury emitted from coal fired power plants. There are relatively few plants, two in Arizona and one in New Mexico, upwind of the project area. While all three plants are relatively small, they do have the potential to produce mercury in their emissions. This mercury could be found both in the vegetation and in the soils as a result of wet (rain and snow) and dry (air) deposition. Some of the mercury would be re-emitted through natural processes (decay and transpiration) in the vegetation; however, research suggests that most of the remaining mercury would be found in the organic layer of soil, which, as stated above is largely unaffected by prescribed burning. The most important event that could result in a release of mercury into the atmosphere is a high-severity wildfire.

Smoke is made up of a complex mixture of gases and fine particulates, some of which are known carcinogens and toxins. Research has shown that significant health impacts can occur from the particulate matter (10 microns) found in smoke from wildland fires. The highest probability of significant impacts to health is from fine particulate matter (2.5 microns). There is a low probability of significant health impacts from other trace elements (including mercury) and compounds found in smoke.

The DEIS will analyze and disclose the project's potential effects relative to particulate matter. We do not anticipate the need to estimate the amount of mercury or other trace chemicals and compounds that could be released during prescribed fires because of the low probability that these would impact human health.

Please see the responses to Issues 7, 30, and 31 and Concern 50, which also address prescribed burning.

Concern 57

Since prescribed fire treatments are effective at most for 10 to 20 years (Agee and Skinner 2005), the treated forest is unlikely to encounter the severe fire the Forest Service is designing it to withstand. Thus, there will likely be only negative effects to public health, watershed, soils, and wildlife from prescribed burning without providing any compensatory benefits from reduced fire severity. (Comments 70, 91)

Response

The environmental analysis will analyze and disclose the predicted impacts of the thinning and burning activities in the proposed action against the no action alternative. The conditions projected under the no action alternative will be similar to those prior to both the Las Conchas and Cerro Grande wildfires.

A commenter cites Rhodes and Baker (2008) as calculating the probability of a moderate to severe fire in this forest type as being .0025 percent; thus, a high-severity fire was unlikely to occur. This probability was calculated at a regional scale: all ponderosa pine forests on Forest Service land in Arizona and New Mexico. Rhodes and Baker (2008, p.6) state that this probability is not applicable to smaller analysis areas like the Southwest Jemez Mountains. For our preliminary analysis, we used site-specific data to calculate the probability of a large fire occurrence. The computer program PROBACRE (Wiitala 2008) was used to assess the long-term risk of fire. The risk we looked at was the chance that a defined area over time will be subject to catastrophic consequences from a single wildfire or a series of wildfire events.

We chose a 4,000 acre wildfire event to model. PROBACRE determined there is an equal probability of having at least one 4,000 acre fire every year over the next 20 years and an 18 percent annual chance of having two 4,000 acre fires a year over the next 20 years. The overall probability of exceeding our modeled event of 4,000 burned acres in the next 20 years is 65 percent.

We will discuss large fire probability in detail in the DEIS.

Concern 60

The use of heavy equipment to cut trees spreads hydrocarbon pollutants, which are shown by research to be persistent and toxic to life. (Comment 49)

Response

Any heavy equipment used will meet all federal and state requirements regarding air quality for both pollution controls and fuel standards. Those requirements are designed to protect public health and the environment.

Concern 64

The work plan submitted by the Forest Service as required by the Collaborative Forest Landscape Restoration Program legislation does not adequately address the sustainability of the supply of woody biomass and small diameter trees. (Comment 58)

Response

The CFLRP [work plan](#) covers implementation of the proposed restoration activities on the lands administered by the Forest Service. It covers 9 years (the life of the project) and includes an implementation plan, business plan, documentation of the non-federal investment and a temporary road decommissioning plan. The projected sustainability of the supply of woody biomass and small-diameter trees removed in ecological restoration treatments was addressed in the business plan section. The adequacy of the work plan is irrelevant to the decision to be made.

References

- Abella, S.R., W.W. Covington, P.Z. Fule, L.B. Lentile, A.J. Sanchez Meador, and P. Morgan. 2007. Past, present, and future old growth in frequent-fire conifer forests of the western United States. *Ecology and Society* 12 (2): article 16.
- Agee, J.K. and C.N. Skinner. 2005. Basic principles of forest fuel reduction treatments. *Forest Ecology and Management* 211: 83-96.
- Allen, C.D. 1989. Changes in the landscape of the Jemez Mountains, New Mexico. Ph.D. dissertation. Berkeley, CA: University of California.
- Allen, C.D. 2001. Fire and vegetation history of the Jemez Mountains. Unpublished paper. Los Alamos, NM: U.S. Geological Survey. Available online at <http://www.fort.usgs.gov/products/publications/10003/10003.pdf>
- Allen, C.D., M. Savage, D.A. Falk, K.F. Suckling, T.W. Swetnam, T. Schulke, P.B. Stacey, P. Morgan, M. Hoffman, and J.T. Klingel. 2002. Ecological restoration of Southwestern ponderosa pine ecosystems: A broad perspective. *Ecological Applications* 12 (5):1418-1433.
- Allen, C.D., R. Touchan, and T.W. Swetnam. 1995. Landscape-scale fire history studies support fire management action at Bandelier. *Park Science* (Summer):18-19.
- Arno, S.F. and S. Allison-Bunnell. 2002. *Flames in our forest. Disaster or renewal?* Washington, D.C.: Island Press.
- Baker, M.B. and P.F. Ffolliott. 1999. Interdisciplinary land use along the Mogollon Rim. In M.B. Baker (ed.), *History of watershed research in the Central Arizona Highlands*, pp. 27-34. Gen. Tech. Rep. RMRS-GTR-29. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.
- Converse, S. J., G.C. White, and W.M. Block. 2006. Small mammal responses to thinning and wildfire in ponderosa pine-dominated forests of the Southwestern United States. *Journal of Wildlife Management* 70 (6):1711-1722.
- Cornell University. 2012. Due process. Available online at: http://www.law.cornell.edu/wex/due_process
- Covington, W.W. and M.M. Moore. 1994. Southwestern ponderosa pine forest structure: changes since Euro-American settlement. *Journal of Forestry* 92:39-47.
- Covington, W.W., P.Z. Fule, M.M. Moore, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, and M.R. Wagner. 1997. Restoring ecosystem health in the ponderosa pine forests of the Southwest. *Journal of Forestry* 95(4): 23-29.

- Covington, W.W., P.Z. Fule, S.C. Hart, and R.P. Weaver. 2001. Modeling ecological restoration effects on ponderosa pine forest structure. *Restoration Ecology* 9 (4):421-431.
- Cram, D.R., T.T. Baker, and J.C. Boren. 2006. Wildland fire effects in silviculturally treated vs. untreated stands of New Mexico and Arizona. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.
- DeGomez, T., C.J. Fettig, J.D. McMillin, J.A. Anhold, and C. Hayes. 2008. Managing slash to minimize colonization of residual trees by *Ips* and other bark beetle species following thinning in Southwestern ponderosa pine. Extension publication AZ1448. Tucson, AZ: Arizona Cooperative Extension, University of Arizona. Available online at: <http://cals.arizona.edu/pubs/natresources/az1449.pdf>
- Fairweather, M.L., J. McMillin, T. Rogers, D. Conklin, and B. Fitzgibbon. 2006. Field guide to insects and diseases of Arizona and New Mexico. MB-R3-16-3. Albuquerque, NM: USDA Forest Service, Southwestern Region.
- Fajardo, A., J.M. Graham, J.M. Goodburn, and C.E. Fiedler. 2007. Ten-year responses of ponderosa pine growth, vigor, and recruitment to restoration treatments in the Bitterroot Mountains, Montana, USA. *Forest Ecology and Management* 243: 50-60.
- Falk, D.A. 2006. Process-centred restoration in a fire-adapted ponderosa pine forest. *Journal for Nature Conservation* 14: 140-151.
- Fiedler, C.A. K.L. Metlen, and E.K. Dodson. 2010. Restoration treatment effects on stand structure, tree growth, and fire hazard in a ponderosa pine/Douglas-fir forest in Montana. *Forest Science* 56 (1):18-31.
- Ffolliott, P.F., G.J. Gottfried, and M.B. Baker, Jr. 1989. Water yield from forest snowpack management: Research Findings in Arizona and New Mexico. *Water Resources Research* 25 (9): 1999-2007.
- Fulé, P.Z. 2008. Does it make sense to restore wildland fire in changing climate? *Restoration Ecology* 16 (4):526-531.
- Fulé, P.Z., W.W. Covington, and M.M. Moore. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. *Ecological Applications* 7 (3):895-908.
- Fulé, P.Z., J.E. Crouse, J.P. Roccaforte, and E.L. Kalies. 2012. Do thinning and or burning treatments in western USA ponderosa or Jeffrey pine-dominated forests help restore natural fire behavior? *Forest Ecology and Management* 267:68-81.
- Gottfried, G.J., and P.F. Ffolliot. 2009. Snowpack dynamics in an opening and a thinned stand in a ponderosa pine forest. *Hydrology and Water Resources in Arizona and the Southwest* 39:9-15
- Griffis, K.L., J.A. Crawford, M.R. Wagner, and W.H. Moir. 2001. Understory response to management treatments in northern Arizona ponderosa pine forests. *Forest Ecology and Management* 146:239-245.
- Halpern, C.B., R.D. Haugo, J.A. Antos, S.S. Kaas, and A.L. Kilanowski. 2012. Grassland restoration with and without fire: Evidence from a tree-removal experiment. *Ecological Applications* 22: 425-441.

- Harrod, R.J., D.W. Peterson, N.A. Povak, and E.K. Dodson. 2009. Thinning and prescribed fire effects on overstory tree and snag structure in dry coniferous forests of the interior Pacific Northwest. *Forest Ecology and Management* 258:712-721.
- Harrod, R.J., N.A. Povak, and D.W. Peterson. 2007. Comparing the effectiveness of thinning and prescribed fire for modifying structure in dry coniferous forests. In *The fire environment-Innovations, management, and policy: The conference proceedings*, pp. 329-346, edited by B. W. Butler and W. Cook. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.
- Kalies, E.L., C.L. Chambers, and W.W. Covington. 2010. Wildfire responses to thinning and burning treatments in southwestern conifer forests: A meta-analysis. *Forest Ecology and Management* 259:333-342.
- Kauffman, J.B., R.L. Beschta, N. Otting, and D. Lytjen. 1997. An ecological perspective of riparian and stream restoration in the western United States. *Fisheries* 22: 12-24.
- Kauffman, J.B. 2004. Death rides the forest: Perceptions of fire, land use, and ecological restoration of Western forests. *Conservation Biology* 18(4): 878-882.
- Kaye, J.P., S.C. Hart, R.C. Cobb, and J.E. Stone. 1999. Water and nutrient outflow following the ecological restoration of a ponderosa pine-bunchgrass ecosystem. *Restoration Ecology* 7 (3):252-261.
- Kolb, T.E., M.R. Wagner, and W.W. Covington. 1994. Concepts of forest health. *Journal of Forestry* 92(7): 10-15.
- Lee, D.C., and L.L. Irwin. 2005. Assessing risks to spotted owls from forest thinning in fire-adapted forests of the western United States. *Forest Ecology and Management* 211:191-209.
- Leenhouts, B. 1998. Assessment of biomass burning in the conterminous United States. *Conservation Ecology*. 2(1): article 1. Available online at: <http://www.ecologyandsociety.org/vol2/iss1/art1/>
- Lowe, K. 2006. Effects of forest thinning treatments on fire behavior. Working Paper 15. *Working Papers in Southwestern Ponderosa Pine Restoration*. Flagstaff, AZ: Southwest Ecological Restoration Institute. Available online at <http://library.eri.nau.edu/gsd/collect/erilibra/index/assoc/HASH014c.dir/doc.pdf>
- McIver, J., K. Erickson, and A. Youngblood (eds.). 2012. Principal short-term findings of the national fire and fire surrogate study. Gen. Tech. Rep. PNW-GTR-860. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. Available online at: <http://www.treearch.fs.fed.us/pubs/40439>
- Moore, M.M., D.W. Huffman, P.Z. Fulé, W.W. Covington, and J.E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50(2): 162-176. Available online at <http://library.eri.nau.edu/gsd/collect/erilibra/import/MooreEtal.2004.ComparisonOfHistoricalAndContemporary.pdf>
- Noss, R.F., J.F. Franklin, W.L. Baker, T. Schoennagel, and P.B. Moyle. 2006. Managing fire-prone forests in the western United States. *Frontiers in Ecology and the Environment* 4(9): 481-487.

- Platt, R.V., T.T. Veblen, and R.L. Sherriff. 2006. Are wildfire mitigation and restoration of a historic forest structure compatible? A spatial modeling assessment. *Annals of the Association of American Geographers* 96: 455-470.
- Pollett, J. and P.N. Omi. 2002. Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. *International Journal of Wildland Fire* 11: 1-10.
- Rhodes, J.J. and W.L. Baker. 2008. Fire probability, fuel treatment effectiveness, and ecological tradeoffs in Western U.S. public forests. *The Open Forest Science Journal* 1: 1-7.
- Roccaforte, J.P., P.Z. Fule, and W.W. Covington. 2008. Landscape-scale changes in canopy fuels, and potential fire behaviour following ponderosa pine restoration treatments. *International Journal of Wildland Fire*. 17: 293-303.
- Safford, H.D., J.T. Stevens, K. Merriam, M.D. Meyer, and A.M. Latimer. 2012. Fuel treatment effectiveness in California yellow pine and mixed conifer forests. *Forest Ecology and Management* 274: 17-28.
- Santa Fe National Forest and Valles Caldera National Preserve (SNF and VCNP). 2010. *Southwest Jemez Mountains collaborative forest landscape restoration proposal for funding Section 12: Landscape strategy*. Santa Fe, NM: Santa Fe National Forest.
- Skov, K.R., T.E. Kolb, and K.F. Wallin. 2004. Tree size and drought affect ponderosa pine physiological response to thinning and burning treatments. *Forest Science* 50(1): 81-91.
- Skov, K.R., T.E. Kolb, and K.F. Wallin. 2005. Difference in radial growth response to restoration thinning and burning treatments between young and old ponderosa pine in Arizona. *Western Journal of Applied Forestry* 20 (1):36-43.
- Stephens, S. 1998. Evaluation of the effects of silvicultural and fuels treatments on potential fire behavior in Sierra Nevada mixed-conifer forests. *Forest Ecology and Management* 105: 21-35.
- Swanson, F.J., J.A. Jones, D.O. Wallin, J.H. Cissel, 1994. Natural variability-implications for ecosystem management. In: M.E. Jensen and P.S. Bourgeron (eds.), *East-side forest ecosystem health assessment, Vol. II, Ecosystem Management: Principles and Applications* pp. 80-94. Gen. Tech. Rep. GTR-PNW-318. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Swetnam, T. and C. Baisan. 1996. Historical fire regime patterns in the southwestern United States since AD 1700. In: *Fire effects in Southwestern forests: Proceedings of the second La Mesa Fire Symposium; 1994, March 29-31, Los Alamos, NM*, pp. 11-32, edited by C. D. Allen. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Tappeiner, J.C., D.A. Macguire, and T.B. Harrington. 2007. *Silviculture and ecology of western U.S. forests*. Corvallis, OR: Oregon State University Press.
- Touchan, R., T.W. Swetnam, and H.D. Grissino-Mayer. 1995. Effects of livestock grazing on pre-settlement fire regimes in New Mexico. In: J.K. Brown, R.W. Mutch, C.W. Spoon, and R.H. Wakimoto, eds., *Proceedings: Symposium on Fire in Wilderness and Park Management, 1993 March 30 - April 1, Missoula, Montana*. General Technical Report INT- 320, pp. 268-272. Ogden, UT: USDA Forest Service, Intermountain Research

- Station. Available online at: <http://tree.ltrr.arizona.edu/~tswetnam/tws-pdf/livestockgrazing.pdf>
- Touchan, R. and T.W. Swetnam. 1995. *Fire history in ponderosa pine and mixed conifer forests of the Jemez Mountains, Northern New Mexico, A final report submitted to the US Forest Service, Santa Fe National Forest and U.S. National Park Service, Bandelier National Monument*. Tucson, AZ: Laboratory of Tree-Ring Research, University of Arizona. Available online at: http://prdp2fs.ess.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5384292.pdf
- Touchan, R., C.D. Allen, and T.W. Swetnam. 1996. Fire history and climatic patterns in ponderosa pine and mixed-conifer forests of the Jemez Mountains, Northern New Mexico. In *Fire effects in Southwestern forests: Proceedings of the second La Mesa Fire Symposium; 1994, March 29-31, Los Alamos, NM*, pp. 33-46, edited by C. D. Allen. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Triepke, F.J., B.J. Higgins, R.N. Weisz, J.A. Youtz, and T. Nicolet. 2011. Diameter caps and forest restoration: Evaluation of a 16-inch cut limit on achieving desired conditions. Albuquerque, NM: USDA Forest Service, Southwestern Region.
- Troendle, C.A., L.H. MacDonald, C.H. Luce, and I.J. Larsen. 2010. Fuel management and water yield. In *Cumulative watershed effects of fuel management in the western United States*, pp. 124-148, edited by W. J. Elliot, I. S. Miller and L. Audin. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.
- USDA Forest Service (USFS). 2010. *SW Jemez Mountains landscape assessment report*. Albuquerque, NM: USDA Forest Service, Southwestern Region.
- U.S. Department of Justice. 2012. A guide to disability rights law. Available online at <http://www.ada.gov/cguide.htm#anchor65610>
- Waltz, A.E.M., P.Z. Fule, W.W. Covington, and M.M. Moore. 2003. Diversity in ponderosa pine forest structure following ecological restoration treatments. *Forest Science* 49 (6): 885-900.
- Weaver, H. 1943. Fire as an ecological and silvicultural factor in the ponderosa-pine region of the Pacific Slope. *Journal of Forestry* 41: 7-14.
- Weaver, H. 1951. Fire as an ecological factor in the Southwestern ponderosa pine forests. *Journal of Forestry* 49: 93-98.
- Wiitala, M. 2008. PROBACRE user's manual. Portland, OR: U.S. Forest Service Aviation and Fire Management, Pacific Northwest Region.
- Williams, M.A., and W.L. Baker. 2012. Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests. *Global Ecology and Biogeography*. 21(10): 1042-1052.
- Woods, S.W., R. Ahl, J. Sappington, and W. McCaughey. 2006. Snow accumulation in thinned lodgepole pine stands, Montana, USA. *Forest Ecology and Management* 235: 201-211.
- Youngblood, A. 2010. Thinning and burning in dry coniferous forests of the western United States: