

CHAPTER 1

PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (40 CFR, Parts 1500 - 1508) and other Federal, State and County laws and regulations. This Environmental Assessment discloses the direct, indirect and cumulative impacts that could result from implementation of the proposed action and alternatives. It also provides supporting information for a determination to prepare either an Environmental Impact Statement or an Environmental Assessment and Finding of No Significant Impact.

The EA is organized into four chapters:

Chapter 1 Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2 Alternatives Considered: This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the interdisciplinary team, public, and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Chapter 3 Environmental Effects: This chapter describes the environmental effects of implementing the proposed action and other alternatives. Each resource discussion would include short-term uses, long-term productivity, and cumulative effects of each alternative proposed for implementation.

Chapter 4 Consultation and Coordination: This brief section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Appendices: The appendices provide more detailed information to support the analysis presented in the preliminary assessment.

PURPOSE AND NEED FOR ACTION

In compliance with the National Environmental Policy Act (NEPA) the purposes for this project are as follows.

Fuels and Forest Health: Approximately 16,500 acres of the area (18% of the total) is currently susceptible to crown fire under extreme fire weather conditions. Susceptibility to crown fire is a measure of the quantities and/or arrangement of surface and aerial fuels (standing trees). Susceptible areas are those having 30+ tons per acre of fuel (e.g., down trees, old logging debris) and/or that have many small trees under surface fire resistant trees of large diameter. Small trees provide an avenue (called ladder fuels) for a surface fire to transition into a high severity crown fire. The present state of the forest is due to human's successful suppression of fire since approximately 1890.

The project area is predominately ponderosa pine with piñon-juniper at the lowest elevations and mixed conifer on cooler moister northern aspects. An aspect is the compass direction that a sloped surface faces. Meadows are scattered throughout. Forest conditions range from dense

thickets of poles and saplings to stands dominated by large trees with both closed and open stand conditions. This variability in forest composition and structure provides habitats for a variety of wildlife. Planned ignitions would reduce the potential for crown fire while maintaining a forest landscape with diverse ecological conditions.

This project area is also a logical continuation of two existing projects that are currently being implemented; the Camino/Corral Forest Health and Wildlife Habitat Improvement Project and Mesa Alta Meadow and Wildlife Habitat Restoration Project.

Wildlife Management: Most of the project area, outside the Chama River Canyon Wilderness, has been identified by the New Mexico Department of Game and Fish as a priority for managing Mule deer, Rocky Mountain elk, Wild turkey and numerous other wildlife species. There is a need to increase the quantity and quality of browse and forage. Gambel oak, mountain mahogany, snow berry, and New Mexico locust grow throughout the area and are important browse for Mule deer, Rocky Mountain elk and other wildlife. The majority of these plant communities are in a late successional stage and have grown too tall to provide a browse source for wildlife. Planned ignitions would reduce the stature of the shrub component, and enhance the quality and quantity of the forage and browse while maintaining a forest landscape with diverse ecological conditions.

Wilderness Management: For areas within the Chama River Canyon Wilderness (~28,242 acres) the purpose and need is reduce fuel ladder conditions and unacceptably high levels of fuels to reduce the risk of catastrophic wildfire, and to promote conditions that would allow the natural role of lightning caused fires to occur without catastrophic effects. The objectives of this plan are to promote vegetative conditions that will allow future lightning ignitions to play its natural ecological role in creating diversity across this landscape.

PROPOSED ACTION

The (~) 91,000 acre Rio Chama Wildlife Management Planned Ignitions Project consists of both planned and unplanned ignitions (natural fire starts, almost always by lightning), bed preparation units where heavy concentrations of large woody material would be piled and burn, and thinning and mulching to protect existing capital investments. Capital investments include fences, corrals, and water (trick) tanks. No road construction is required, nor would roads that are currently closed need to be opened. Approximately (~) 51,000 acres of the project area is outside of the Chama River Canyon Wilderness and would be managed by planned ignitions and unplanned ignitions.

The majority of the remaining (~) 40,000 acres of the project area lies within the Chama River Canyon Wilderness (28,242 acres). The Wilderness would be managed through unplanned ignitions as well as planned ignitions initiated outside the Wilderness which are allowed to spread into it under prescribed conditions. No planned or unplanned ignitions occurring outside the Wilderness would be allowed to burn into Gallina River Canyon as a mitigation measure to protect the air quality at the confluence of the Rio Gallina and the Rio Chama.

Planned and unplanned ignitions would consist of broadcast burns of low to moderate fire intensities with flame lengths less than 6 feet. The objectives are to improve and increase the browse component and understory vegetation while reducing surface and ladder fuels.

Outside the Wilderness there are approximately 4,635 acres of fuel bed preparation units with large quantities of down trees and woody material that would be loosely piled by hand, or by using tracked heavy equipment using a bucket and thumb prior to burning.

Approximately 110 acres of mechanical thinning using chainsaws and/or grinders would be implemented to provide protection to 4 trick tanks, 12 spring developments with troughs, 3 corrals, approximately 9 miles of fence, two communication sites and private land. Protection of these resources requires thinning of small trees and brush to allow the use of planned ignitions and unplanned without damage.

The objective is to maintain tall-stature Gamble oak (> 4 inch dbh and > 10 feet in height) with low severity planned ignitions while treating short-stature shrubs with moderate severity fire to reduce its stature and provide browse for wildlife.

The project area would be maintained either through unplanned ignitions or through periodic planned ignitions following the initial entry with fire. The proposed project would be implemented beginning in the spring of 2010 and continue until completed. The Forest Service plans to burn between 2,000 to 6,000 acres a year dependent of weather, fuel conditions, and available funding. The size of the planned ignitions would be determined by forest and fuel conditions, fire behavior and results, terrain, weather, and time of year.

Please refer to **Chapter II-Alternatives Considered** for further details of the Proposed Action including all mitigation measures.

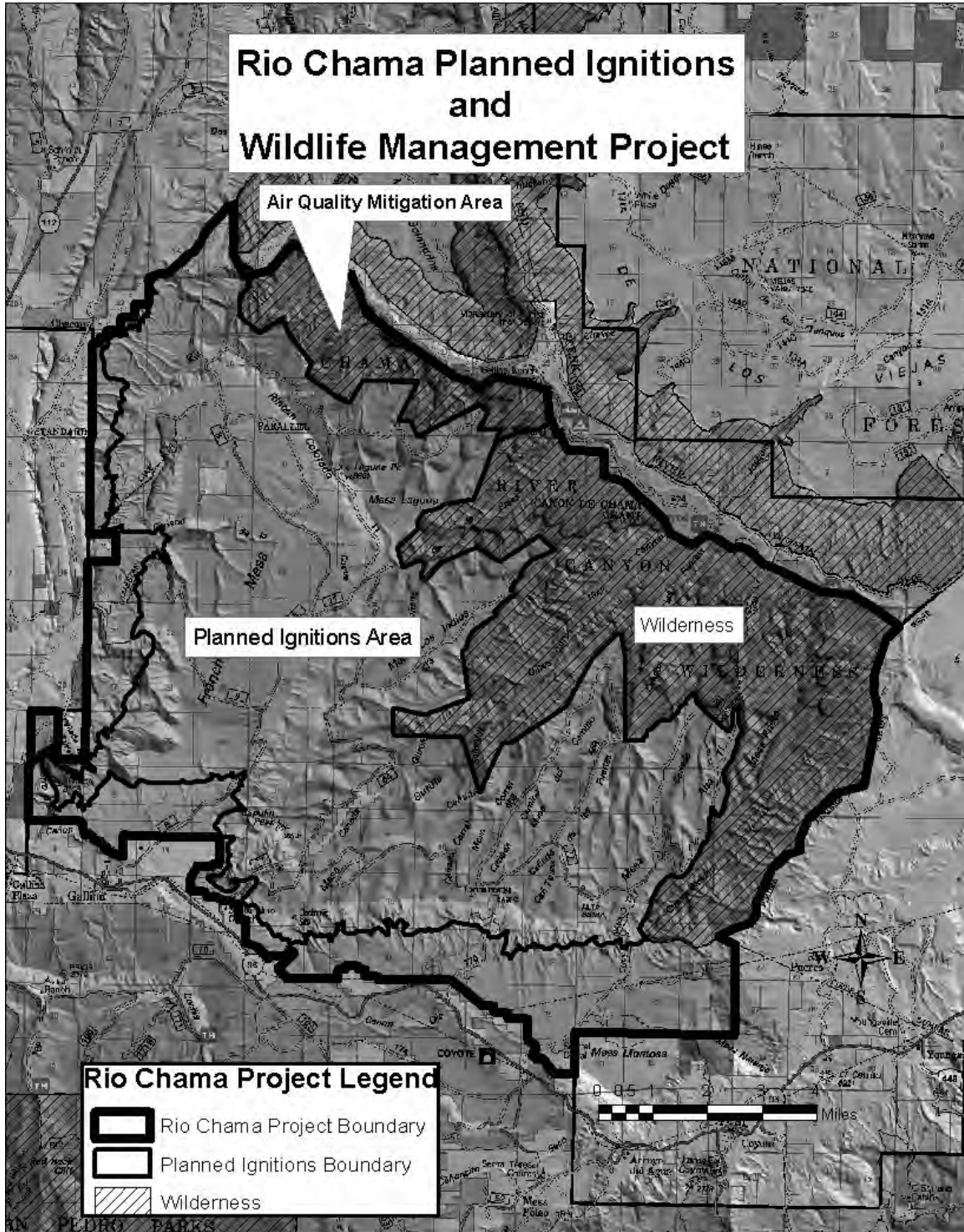
LOCATION, SETTING AND BACKGROUND

The project area is located on the Coyote Ranger District Santa Fe National Forest between the Chama River Canyon Wilderness and Rio Gallina (north and east) Highway 96 (south), and the Forest boundary (west) between T23N, R1E to T25 N, R3E. Please see the attached map. The project area ranges in elevation from approximately 6,300 to 8,700 feet above sea level. Plant communities range from low-elevation piñon-juniper and sagebrush flats to higher elevation mixed conifer stands. The project area is dominated by ponderosa pine-oak, and ponderosa pine-fescue associations. The landscape can be generally characterized as a mesa top surrounded by vertical rock outcrop composed of sandstone, mudstones and conglomerates. These rock outcrops dominate the viewshed within the Rio Chama Canyon Wilderness, and the Rincon Colorado on French Mesa. Table 1 illustrates the primary forested ecosystems of the project area.

Table 1 Primary Vegetation Types

Forest/Grassland/Shrublands/Rock Outcrop/etc.	Acres
Ponderosa pine	37,442
Mixed Conifer Forest Ponderosa pine/White fir and Douglas-fir	11,369
Piñon/Juniper Woodlands Piñon/Juniper and Juniper Woodland	31,574
Grasslands	774
Non-Forest Rock Outcrop/Badlands	4,371
Oak	2,755
Sagebrush	2,996
TOTAL	92,228

Map 1



FOREST PLAN DIRECTION

The 1987 Santa Fe Forest Plan, as amended (Forest Plan) sets the goals and objectives for the management of the Santa Fe National Forest. Goals describe the desired resource conditions sometime in the future and are the basis for project-level planning. The standards, guidelines, and management direction contained in the 1987 Forest Plan set parameters with which the project must take place. Approval of any management activity, such as planned ignitions (prescribed fires) and forest health thinning, must be consistent with these parameters (16 U.S.C. 160(i)). The Forest Plan can be found at: <http://www.fs.fed.us/r3/sfe/projects/plansReports/index.html>. The actions proposed here respond to the goals and objectives outlined in the Santa Fe National Forest Plan, and helps move the project area towards the desired conditions described in that plan as described below.

Forest Plan goal statements for:

Wilderness, pg 19

1. Provide a wilderness management program that achieves the intent of the Wilderness Act of 1964.
2. Maintain enduring, high quality wilderness values while providing for quality wilderness recreation experiences.
3. Allow wildfire to play a natural role.
4. Protect air quality related values in Class I wilderness areas.

Fire Management, pg. 22

1. Protect life and property from wildfire.
2. Protect forest resources from wildfire at a level commensurate with the value of the resource.
3. Utilize planned ignitions as a tool where it can effectively accomplish resource management objectives.

Forest Plan, pgs 75-76

2. Planned ignitions may be used:
 - a. on areas with suitable fuel types,
 - b. on areas where the proper vegetative response can be expected,
 - c. where the fire will not pose a threat to human safety or surrounding property,
 - d. on slopes greater than 40 percent, with careful resource consideration.
 - e. on soils with moderate or high revegetation potential.
 - f. soils with low revegetation potential, as long as 40% of the vegetative cover remains.
 - g. on piñon-juniper retreatment areas with adequate fine fuels to carry fire throughout the stand. 80 percent of the trees are 4 feet in height or less, with more than 60 trees per acre. Areas must have viable grass cover after treatment;

Forest-wide S&Gs, pgs 93

Prescribed fire, using planned and unplanned ignitions, will be used to enhance and accomplish resource objectives, particularly in fire dependent ecosystems.

Management Area H - Wilderness

Management Emphasis: Management emphasis in these areas is to preserve wilderness character and values. They will be managed to retain their “primeval wild character and influence, without permanent improvements or habitation and ...protected ... to preserve [their] natural conditions.” Primitive recreation opportunities, wildlife habitat management, grazing, and fire management will occur only when consistent with these values and where historically established.

Management Area - H Standards & Guidelines, pgs 128, 129

Low Intensity fires will have no size limitations, but will be monitored to insure they remain within wilderness resource objectives.

Prescribed fire, using either planned or unplanned ignitions may be used to break up unnaturally large areas of continuous fuels to create a more natural mosaic. Natural fires can then be allowed to play their ecological role with minimal intervention from protection forces. The historical mosaic of fuels created by fires is estimated to be 50 to 150 acre.

FOREST LAND MANAGEMENT PLAN DIRECTION

The table below illustrates the land management emphasis for each Land Management Area common to the project area.

Table 1: Forest Plan Management Area Emphasis

Management Area	Acres	Emphasis
Management Area A	38,653	Emphasis is on timber production and enhancement of wildlife habitat diversity... Wildlife -Emphasize on providing even distribution of age classes in forested communities and improve fisheries. Identify elk calving areas that should receive special consideration to retain suitable habitat characteristics.
Management Area C	65	Emphasis is on enhancement of visual quality and developed recreation while protecting essential wildlife habitat and riparian zones. Wildlife -Wildlife emphasis is to enhance threatened or endangered species habitat riparian habitat and fisheries.
Management Area D	11,029	Emphasis is on enhancement of visual quality and dispersed recreation. Wildlife -Wildlife emphasis to enhance riparian habitat, fisheries, and big game winter range. Changes in habitat diversity will be accomplished consistent with visual resource management. Vertical diversity will be emphasized over horizontal diversity.
Management Area G	9,534	Emphasis is on key wildlife habitat protection, habitat improvement, and forage and firewood production. Evaluate for recover of T&E species. Improve elk and turkey winter range through harvest of green p/j. Manage for perches throughout area for songbird and raptor needs. Wildlife -Evaluate these lands and identify opportunities to contribute to threatened and endangered species recovery objectives.
Management Area H	28,242	Chama River Canyon Wilderness. Management emphasis in the Chama River Canyon Wilderness is to preserve wilderness character and values. They will be managed to retain their “primeval wild character and influence, without permanent improvement or habitation and protect...to preserve (their) natural conditions. Primitive recreation opportunities, wildlife habitat management, grazing and fire management will occur only when consistent with these values and where historically established. Wildlife -Manage wildlife habitat in a manner which contributes to wilderness values. Manage native plant and animal species and allow

		for re-introductions of native species.
Management Area P	5,240	Cultural resource location, inventory, nomination, and protection are emphasized here. Emphasis is also on timber production and enhancement of wildlife habitat diversity consistent with other resource integration.
Management Area R	13	Cultural resource location, inventory, nomination, and protection are emphasized. The emphasis is also on wildlife habitat improvement and essential habitat protections and enhancement. Grazing and timber harvest activities occur where compatible with the primary emphasis of this area. Recreation is mostly of a dispersed roaded nature. Wildlife- Wildlife management will emphasize threatened or endangered species habitat enhancement, access management, riparian enhancement and even distribution of seral habitat. The same emphasis is Mule deer, wild turkey, tassel eared squirrel and mountain lion. Prescribe fire will be used primarily for fuels reduction and wildlife habitat enhancement as long as cultural resources can be protected.

FOREST SERVICE MANUAL DIRECTION

Fire Management in Wilderness

2324.2 - Management of Fire

2324.21 - Objectives. The objectives of fire management in wilderness are to:

1. Permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness.
2. Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.

2324.22 - Policy

1. Two types of prescribed fires may be approved for use within wilderness: those ignited by lightning and allowed to burn under prescribed conditions and those ignited by qualified Forest Service officers.
2. No fire may be ignited or allowed to burn without documented, preplanned, specified conditions.
3. Document specific objectives, standards, and guidelines for the control of wildfire and the use of planned ignitions within each wilderness (FSM 5100, 5150, and 5190) in a forest plan or, where the forest planning process has not been completed, in either an interim wilderness management or fire management area plan. Document specific direction for fire program implementation in the forest fire management action plan (FSH 5109.19).
4. Suppress all wildfires within wilderness in accordance with the direction FSM 5130.
5. Fire ignited by lightning may be permitted to burn if prescribed in an approved plan (FSM 2324 and 5150).
6. Forest Service managers may ignite a planned ignitions in wilderness to reduce unnatural buildups of fuels only if necessary to meet at least one of the wilderness fire management objectives set forth in FSM 2324.21 and if all of the following conditions are met:

- a. The use of planned ignitions or other fuel treatment measures outside of wilderness is not sufficient to achieve fire management objectives within wilderness.

b. An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire.

c. The interested public has been involved appropriately in the decision.

d. Lightning-caused fires cannot be allowed to burn because they will pose serious threats to life and/or property within wilderness or to life, property, or natural resources outside of wilderness.

7. Do not use planned ignitions in wilderness to benefit wildlife, maintain vegetative types, improve forage production, or enhance other resource values. Although these additional effects may result from a decision to use prescribed fire, use fire in wilderness only to meet wilderness fire management objectives.

8. Do not use management ignited fire to achieve wilderness fire management objectives where lightning-caused fires can achieve them.

DESIRED CONDITIONS

Desired conditions are the characteristics and conditions that the proposed actions are to create. They provide a snapshot of what the resources would look like when goals, objectives, standards, and guidelines of this project are met. Desired conditions apply to both the present and future. As previously discussed, an Interdisciplinary Team identified the desired resource conditions based on knowledge of the forest composition, structure of historical forest conditions and the role fire plays across the landscape.

The desired future conditions for this project are to have a diversity of healthy forested ecosystems across the landscape with the varied ecological structure and composition that existed prior to active fire suppression. Ponderosa pine stands would be relatively open with clumps of large diameter trees and occasional solitary ones. Mixed conifer stands would be composed of a co-dominant Ponderosa pine and Douglas-fir overstory in clumps and individual trees, as with the Ponderosa pine stands. Both Ponderosa pine and mixed conifer forests would have a strong herbaceous understory consisting of native perennial grasses and forbs.

Piñon/juniper ecosystems would be relatively open as well, dominated by large individual trees widely spaced with a strong herbaceous understory of perennial grasses and forbs. Shrublands common to piñon/juniper to the higher elevation mixed conifer habitats would be highly variable in structure, varying from fresh suckering following planned and unplanned ignitions to stands with relatively large diameter stems with greater height.

Unplanned lightning caused ignitions would ultimately dominate fire occurrence across the landscape without the catastrophic effects. The stand structures and ground fuel characteristics across the landscape would provide limited opportunity for ground fires to access the canopy. Canopy conditions would not facilitate crown fires. Planned and unplanned ignitions would primarily be surface fires burning through fine fuels provided by grasses. The effects of which would be of low severity fire.

The Rio Chama Corridor Wilderness would exhibit similar structure, composition and fuel characteristics as described above. Fire behavior would be that as described for outside the wilderness; primarily surface fires burning through fine fuels provided by grasses. These condition would facilitate the natural role fire has played within the wilderness.

Promote vegetative composition and structure that provides important browse in the form of low-growing shrubs and forage in the form of a strong herbaceous understory composed of native perennial grasses and forbs.

PUBLIC INVOLVEMENT

Scoping required by FSH 1909.15 and by 36 FR 215 was accomplished in October, 2007 when we mailed scoping letters to interested individuals and organizations. The New Mexico Environment Department water quality bureau and homeowners in the area were included on the mailing lists. Area Native American Tribes, Nations and Pueblos were consulted along with New Mexico Game and Fish, the Wilderness Society, and the Continental Divide Trail Alliance among others. The project has been included in the Forest Schedule of Proposed Actions since October, 2007. The formal comment period for the proposed action was conducted from September 1 through October 5, 2009. Agency resource specialists were consulted.

We met with local residents who expressed concerns about effects to air quality and the possibility of escaped planned ignitions. Mitigation measures were adopted to address site specific concerns by local land owners. We met with livestock grazing permittees common to the project area to brief them on the project and resolve any concerns they may have. Mitigation measures designed to limit effects to rangeland management operations were adopted. The Navajo Nation responded with concerns of possible effects to Traditional Cultural Properties. Subsequent correspondence with the Nation resolved those concerns. The Continental Divide Trail Alliance responded with concerns of the effects to the Continental Divide Trail (CDT) that crosses through the project area with a reminder of the intent and character of the CDT must be preserved. The Sangre de Cristo Audubon Society responded with support for the project; however, they expressed concern about the apparent focus on “big game species” and large tree removal. The US Fish and Wildlife Service submitted comments which expressed to the Forest that requirements of the Endangered Species Act, Clean Water Act and the Migratory Bird Treaty Act are completed. Considering the nature and scope of the project, no additional public contact was deemed necessary.

ISSUES

Issues are defined as concerns about the potential effects of the propose actions. The planning team clarified preliminary issues raised and separated them into “key” issues and “other” issues, in accordance with Council for Environmental Quality (CEQ) NEPA regulations in Sec. 1501.7 and 1506.3. If those potential effects could not be mitigated or avoided as part of the proposed actions, they were defined as key issues and used to develop an alternative that might better address those concerns. If the potential impacts could easily be mitigated or avoided, those resources concerns were defined as other issues.

There were few concerns raised about the proposed project and the majority of people support it. Concerns about air quality were addressed by adoption of specific mitigation measures in the proposed action specifically addressing those concerns. Other concerns and comments received

have either been addressed in the proposed action and/or the associated mitigation measures, or were considered beyond the scope of the project and considered as non-significant issues.

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." As for significant issues, the Forest Service identified [6] topics raised during scoping. These issues are included in the table below.

Table X Issues

Issue	Significance	Measures of Effect	Addressed
Air Quality and possible affects to human health of residents of private land located at the confluence of the Gallina River and the Rio Chama	Non-significant	Days of reduced air quality at that location.	Alternative A No Action Alternative B mitigation measures EA page X
Possible escape of planned ignitions and the possible affect on human health and the environment.	Non-significant	Number of acres of planned and unplanned ignitions implemented on the District since 2002	Alternative A No Action
Concern for the visual affects of burned and dead trees along Continental Divide Trail, and the affect on scenery.	Non-significant	Changes in the visual characteristics of vegetation along the CDT within the project area	Alternative A No Action
Concerns that the project emphasizes big game species.	Non-significant	Please see EA Chapter 2 for summary of effects and Chapter 3 pages V-BB for details.	Alternative B
Implementation could affect livestock management operations within the grazing allotments within the project area.	Non-significant	Number of days livestock operations would be affects. Amount of forage consumed by planned ignitions.	Alternative A No Action Alternative B mitigation measures EA page X
Traditional Cultural Properties	Non-significant	Number of TCPs affects	Alternative A No Action Alternative B EA page X

DECISION FRAMEWORK

The District Ranger of the Coyote Ranger District is the responsible official for selecting an alternative for the Rio Chama Wildlife Management Planned Ignitions Project. Based on the environmental analysis, Forest Plan direction, and results of public involvement the Deciding Official must decide whether to authorize implementation of the Proposed Action or another alternative based on evaluating how well the Proposed Actions or an alternative meets the purpose and need while minimizing the potential adverse impacts.

Implementation of the Proposed Action or the No Action Alternative does involve or preclude the use of aggressive fire suppression activities within the project area (within the Wilderness or otherwise) in the event of a wildfire, either natural or human caused. Nor does selection of the No Action Alternative eliminate the possibility of allowing unplanned ignitions to burn under the appropriate conditions.

CHAPTER II

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Rio Chama Planned Ignitions and Wildlife Management Project. Analysis of alternatives requires consideration of a range of reasonable alternatives (40 CFR 1505.1). The range of reasonable alternatives includes both alternatives that warrant detailed analysis, and alternatives that are considered but eliminated from detailed study. In cases where the design and configuration of the proposed action can mitigate resource concerns to acceptable levels, the proposed action may be the only viable action alternative. When there is a significant issue with the proposed action, an alternative to the proposed action shall be developed and analyzed in detail (FSH 1909.15, sec 14). No significant issues were identified during the scoping, nor during the 30 day comment period for this project. These concerns were assessed in Chapter III (Environmental Consequences) of this document.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The following is a description of two alternatives considered by the IDT, but eliminated from detailed study. These alternatives, briefly summarized below, were not reasonably feasible and/or did not address the purpose and need of the project.

No Planned Ignitions Would Be Allowed to Enter Wilderness – This alternative would not have allowed planned ignitions or unplanned ignitions initiated outside of the Wilderness to “creep” or spread into the Wilderness under appropriate conditions. This alternative would address internal concerns of planned ignitions in the wilderness benefiting wildlife. However, implementation of this alternative would not meet the purpose and need, or management objectives for Wilderness management defined in FSM 2324.22-6a, b, c and d. Having no planned ignitions allowed to enter the wilderness would include the Gallina River Canyon. No implementing planned ignitions in the wilderness addresses the concerns of the possible affects to human health due to reduced air quality.

Planned Ignitions within the Rio Chama Corridor Wilderness-This alternative would have proposed implementation of planned ignitions within the Rio Chama Corridor Wilderness to burn with low and moderate intensities. This alternative would have addressed the purpose and need to have fire play a natural role in the wilderness by promoting forest structure and composition, and fuel conditions that would allow for unplanned ignitions to play a more natural role across this landscape. However, due to the extremely steep terrain found within the Wilderness and its remote nature; it would have imposed risks to fire fighter safety during implementation.

ALTERNATIVE CONSIDERED IN DETAIL

Analysis of alternatives requires consideration of a range of reasonable alternatives (40 CFR 1505.1). The range of reasonable alternatives includes both alternatives that warrant detailed analysis, and alternatives that are considered but eliminated from detailed study. In cases where the design and configuration of the proposed action can mitigate resource concerns to acceptable levels, the proposed action may be the only viable action alternative. When there is a significant issue with the proposed action, an alternative to the proposed action shall be developed and analyzed in detail (FSH 1909.15, sec 14). No significant issues were identified during the scoping, nor following the decision under FSH 1909.15, Chapter 31.2– Category #6. We did; however, receive comments during the 30 day comment period for this project. These comments

expressed concerns of a possible escape during planned and unplanned ignitions. These concerns were assessed in Chapter III (Environmental Consequences) of this document.

In addition to the proposed action, Alternative A “no action” alternative has been developed and analyzed in detail. This “no action” alternative provides point-of-reference for describing the environmental effects of the proposed action. In this case the No Action Alternative addresses the effects without planned ignitions without the event of a wildfire, and also assesses the effects of the No Action Alternative in the event of a catastrophic crown fire.

Alternative A “no action” alternative has been developed and analyzed in detail. This “no action” alternative provides point-of-reference for describing the environmental effects of the proposed action. In this case the No Action Alternative addresses the effects without planned ignitions without the event of a wildfire, and also assesses the effects of the No Action Alternative in the event of a catastrophic crown fire. The second alternative (Alternative B) is the Proposed Action.

The following table illustrates the proposed action for each alternative. Note, that although planned ignitions are not part of Alternative A, unplanned ignitions may be allowed to burn within the wilderness under existing law and policy.

Table 2: Treatment Acres by Alternative

Action	Alternative A	Alternative B
Planned Ignitions Outside Wilderness	0 acres	Up to 51,000 acres
Unplanned Ignitions Within Wilderness	*3,000 – 5,000 acres	Up to 28,242 acres
Bed Preparation Heavy Fuel Pre-Treatment	0 acres	4,635 acres

*Unplanned ignitions that were allowed to burn within the Wilderness from 2002 to 2006 involved approximately 3,305 acres.

ALTERNATIVE A - No Action

Alternative A would not implement planned ignitions at this time. No human initiated planned ignitions (prescribed fires) would be implemented. Under appropriate conditions and within prescription, fires initiated by lightning could be allowed to burn as unplanned ignitions within the project area, both outside and within the Rio Chama Canyon Wilderness.

No bed preparation or activities (thinning and mulching) designed to protect capital investments from fire; such as fence lines, water developments, private land or communication sites would occur.

Suppression of unplanned ignitions during extreme fire weather conditions would continue under this alternative.

Implementation of the Camino/Corral Forest Health and Wildlife Habitat Improvement Project (September 28, 2004), and the Mesa Alta Meadow and Wildlife Habitat Restoration Project (Decision September 27, 2001) will continue.

ALTERNATIVE B - Proposed Action

The proposed action consists of 91,000 acres. There are approximately 51,000 acres outside of the Chama River Canyon Wilderness that would be managed by planned ignitions and unplanned ignitions through natural starts, and 40,000 acres of the project area (28,242 acres within the Chama River Canyon Wilderness) would be managed through unplanned ignitions or by allowing planned ignitions initiated outside the wilderness to spread into it.

Planned ignitions and unplanned ignitions (natural starts) outside the Wilderness would be allowed to burn into wilderness areas except for the Gallina River Canyon. As a mitigation measure to protect the air quality at the confluence of the Rio Gallina and the Rio Chama; there would be no planned ignitions allowed to migrate into the Rio Gallina Canyon.

Planned ignitions would consist of broadcast burns of low to moderate fire intensities with flame lengths less than 6 feet. The objectives are to improve and increase the browse component and understory vegetation while reducing surface and ladder fuels.

Outside the Wilderness there are approximately 4,635 acres of fuel bed preparation units. These areas have large quantities (+30 tons) of cull logs and woody material from previous timber sales and thinning. This material would be loosely piled by hand, and/or with tracked heavy mechanical equipment using a boom and bucket with an opposing thumb prior to burning. Burning these heavy large fuels in a broadcast burn would generate large quantities of smoke for long durations. Large fuels tend to burn slowly and inefficiently in a broadcast situation, piling the material allows for more efficient combustion and less smoke. The piles can be burned in the winter. Limiting the number of piles burned at any one time reduces the amount of smoke produced.

Approximately 110 acres of mechanical thinning using chainsaws and/or grinders would be implemented to provide protection to 4 trick tanks, 12 spring developments with troughs, 3 corrals, approximately 9 miles of fence, two communication sites and private land. Protection of these resources requires thinning of small trees and brush.

Tall-stature Gamble oak (> 4 inch dbh and > 10 feet in height) would be maintained with low severity planned ignitions while short-stature shrubs would be treated with moderate severity fire, to reduce its stature and provide browse for wildlife.

The project area would be maintained following treatment either through fire from unplanned ignitions or through fire from periodic planned ignitions. The proposed project would be implemented beginning in 2010 and continue until completed. The Forest Service plans on burning between 2,000 to 6,000 acres a year dependent on weather and fuel conditions, and available funding. The size of the planned ignitions would be determined by forest and fuel conditions, fire behavior and results, terrain, weather, and time of year. No road construction is required, nor would roads that are currently closed need to be opened.

National Historic Preservation Act of 1966 Compliance

Initiation of work would be accomplished in phases in compliance with applicable provisions of the National Historic Preservation Act (NHPA) for the protection of historic properties. The clearance recommendations associated with this project are made in compliance with the provisions of the First Amended Programmatic Agreement. Regarding Wildland Urban Interface and Other Large-Scale Hazardous Fuels Reduction Projects dated March 5, 2004 executed in compliance with the implementing regulations (36 CFR 800.14) of NHPA. Implementation of

any phase of the project would be contingent upon completion of the identification and protection of historic properties and compliance with applicable provisions of the NHPA in accordance with this Agreement.

In compliance of this agreement and the recommendations made in the clearance report completed for this project, planned ignitions outside the blocks targeted by the District (phase 1) would receive clearance during additional phases of this project, but clearance is not recommended at this time for burning outside blocks.

Implementation of planned ignitions, or ground based or ground disturbing activities would be implemented contingent upon completion of identification and protections of historic properties in accordance with provisions of the NHPA in accordance with the agreement.

Initiation of work in any phase of the project would be contingent upon completion of the identification and protection of historic properties and compliance with applicable provisions of the NHPA in accordance with the Agreement.

Mitigation Measures

Rangeland/Grazing Management

No more than 30 percent of any given allotment common to the project area will be subjected to fire within a two year time frame. The objective is to implement the project without disruption of on-going rangeland management.

All fence lines and water developments will be protected from planned ignitions by removal of fuels by thinning with chain saws, followed by lop and scatter or pile burning.

Livestock operators will alter grazing strategies (rest and deferment, turn out dates, etc) when possible to allow understory vegetation to become established prior to receiving grazing pressure.

Air Quality

Planned ignitions will not be initiated within the Rio Gallina Canyon nor will planned ignitions initiated outside the Rio Gallina Canyon be allowed to migrate into it. The objective is to minimize the potential affects to air quality at the confluence of the Rio Chama and Rio Gallina.

Non-Native Invasive Weeds

All heavy equipment, engines, snow mobiles, ATVs etc. will be pressure washed of debris and mud prior to moving into the project area. The objective is to minimize the potential for the introduction or dispersal of non-native plants.

Watershed/Soil Productivity

Heavy equipment will operate only when soils are relatively dry. Precipitation resulting in pooling of water on roads or rutting of roads will warrant suspension of ground based activities.

Heavy equipment will not be allowed to operate on slopes greater than 40 percent.

Large woody material in all drainages and streams (washes and intermittent) will be left in place to provide effective ground cover and sediment retention.

Fuel bed preparation will use tracked or rubber tired equipment with a boom and bucket with an opposing thumb to pick and pile large woody material. Brush Rakes and grapple skidders will not be allowed for bed preparation.

Planned ignitions of low to moderate severity will be allowed to “back down” into riparian areas and drainages. The objectives are to assure the retention of snags and down woody material.

No ground based equipment, heavy equipment, ATVs, engines, nor trucks will use meadow communities to access project area for preparation of and/or implementation of planned ignitions operations.

Heritage Resources

All ground disturbing activities will occur in areas that have received valid survey. Ground disturbing activities not in areas of valid survey will receive cultural resource clearance before implementation.

All sites will be avoided by all ground disturbing activities.

All documented sites within areas to be burned will be evaluated for heavy fuel loading. Heavy fuels will be cut with chain saws and removed by hand from susceptible features prior to the initiation of burning activities.

New sites discovered during activities associated with the burn will be reported to the Forest and/or District Archaeologist. Newly discovered sites will receive the same treatment as previously documented sites.

All fire sensitive sites shown in Table 6 (see analysis file) will be protected as per the conditions of the Agreement dated March 5, 2004.

The Forest and/or District Archaeologist will participate in the decision to use fire with multiple objectives using available information to make recommendations to the deciding officer.

Monitoring and Adaptive Management

Monitoring would be conducted via an interdisciplinary approach. Monitoring activities include, but are not limited to observing the planned ignitions behavior during implementation and evaluating the success at meeting the objectives of the treatments. Smoke management and monitoring would be evaluated by obtaining the appropriate burn permits from the New Mexico Environment Department and documenting that we meet the objectives of the permits. Meeting the objectives of using planned ignitions in the Rio Chama Canyon Wilderness would be implemented through an interdisciplinary approach in coordination with the Santa Fe National Forest Recreation, Lands, and River Program Manager. Strategies would include use of permanent photo points along FR151 in the Chama River Corridor to evaluate possible changes in the visual character, and evaluation of site specific effects of planned ignitions allowed to spread into the Wilderness, and along the Continental Divide Trail.

Per the terms and conditions documented in the Section 106 report and outlined in the *First Amended Programmatic Agreement Regarding Wildland Urban Interface and Other Large-Scale Hazardous Fuels Reduction Projects*, appropriate post-project monitoring to assess effectiveness

of protection measures in accordance with FSM 2361.28.5 will include monitoring 20% of the protected fire-sensitive sites in the planned ignitions areas. In addition, each forest will incorporate into the inventory report, for at least one project each year, the requirement to monitor a minimum of 20% of sites *not considered* fire sensitive within the burn area. The purpose of post-treatment monitoring is to gather data that will be used to improve planning for protection of heritage resources in future projects. Site specific monitoring requirements will be documented in the inventory report and on the IS& A. This list and summary of monitoring results will be included in the annual summary report to the SHPO and the Advisory Council on Historic Preservation.

Comparison of Alternatives

Table 3 at the beginning of this chapter compares alternatives in terms of acres of forest susceptible to crown fire treated, the acres of heavy fuels treated, the potential improvement in forage and browse.

Table 5 below compares the changes in forest structure and composition, and the changes in fire behavior by alternative. Note the No Action Alternative addressed current conditions without the occurrence of fire (unplanned or planned ignitions) and the changes that would occur over time. Alternative A also addresses the effects following unplanned ignitions with high fire intensity.

Table 5 Effects Comparisons by Alternative

Stand Structure and Composition /Mixed Size Classes Ponderosa pine w/large Trees	Alternative A		Alternative B
	Without Fire Current Conditions	Following High Intensity Wildfire	Proposed Action (Managed fire from planned and/or unplanned ignitions)
Crown Fire Hazard Rating	LOW	LOW	LOW
Species Composition	100% Ponderosa pine	100% Ponderosa pine	100% Ponderosa pine
Trees/Acre	98	32	58-71
Stand Density Index	30%	17%	24%
Basal Area	100 sqft/ac	63 sqft/ac	84-89 sqft/ac
Snags/Acres > 10 inches dbh	1/acre	65/acre	9-11/acre
Avg Diameter	13.7” dbh	18.9” dbh	14.8-16.3” dbh
<i>Continued next page</i>			

dbh= tree diameter at breast height in inches
Basal Area= the cross-sectional area contributed by trees in square feet per acre.

Table 5 continued Effects Comparisons by Alternative

	Alternative A		Alternative B
Stand Structure and Composition Evenly spaced pole and sapling size Ponderosa pine/without/large trees	Without Fire Current Conditions	Following High Intensity Wildfire	Proposed Action
Crown Fire Hazard Rating	MODERATE	N/A	MODERATE
Species Composition	100% Ponderosa	100% Grass/shrub	100% Ponderosa pine
Trees/Acre	364	0	117-188
Stand Density Index	39%	.02%	20-23%
Basal Area	100 sqft/ac	4 sqft/ac	57-62 sqft/ac
Snags/Acres > 10 inches dbh	0/acre	20/acre	3/acre
Avg Diameter	7.1" dbh	1.4" dbh	7.8-9.5" dbh
	Alternative A		Alternative B
Stand Structure and Composition Mixed Conifer/Mixed Size Class	Without Fire Current Conditions	Following High Intensity Wildfire	Proposed Action
Crown Fire Hazard Rating	EXTREME	N/A	MODERATE
Species Composition	53% white fir 36% Douglas fir 3% aspen 3% ponderosa pine	Aspen	5-9% white fir 2-5% Douglas fir 83-91% aspen 2% ponderosa pine
Trees/Acre	567	316 (all aspen regen)	1200-1300 (includes aspen sprouts)
Stand Density Index	41%	.02%	23%
Basal Area	142 sqft/ac	4 sqft/ac	73-91 sqft/ac
Snags/Acres >10 inches dbh	1/acre	109/acre	29/acre
Avg Diameter	6.8" dbh	.02" dbh	3-4" dbh
Ponderosa pine/mixed size class w/large trees	37,442 Acres	Acres	acres
Ponderosa pine/even size class without/large trees		Acres	acres
Mixed Conifer	11,369 Acres	Acres	acres
Wildlife Habitat- Threatened and Endangered Species	000	000	000
Wilderness Acres Treated planned ignitions allowed into	1500-3500 acres per five years	1500-3500 acres per five years	3500-5000 acres per five years

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CHAPTER III

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter summarizes the physical and biological, social and economic environments of the affected project area and the cause and effect relationship of implementing each alternative on that environment. It also presents the scientific and analytical basis for comparison of alternatives presented in the previous charts. Resource specialists analyze the magnitude of direct, indirect, and cumulative effects of the proposed activities on both short and long-term effects. Only information necessary to understand the environmental consequences is included in this document. The project record contains all project-specific information, including specialist reports and results of the public participation. The project record is located at the Coyote Ranger Station. Information from the record is available upon request.

The following are definitions of terms used in discussing the environmental effects of proposed activities.

Affected environment (40 CFR 1502.15) is a brief description of the area(s) to be affected by the proposed activities. The description shall be no longer than is necessary to understand the effects of the alternatives. **Direct effects** (40 CFR 1508.8) are those occurring at the same time and place as the triggering action (e.g. Current authorized livestock grazing on riparian areas). **Indirect effects** (40 CFR 1508.8) are those caused by the action, but occur later, or at a distance from the triggering action (e.g. Sediment input into streams due to a loss of vegetative cover from grazing activities). **Cumulative effects** (40 CFR 1508.7) are the effects on the environment that results from incremental effect of the action added to the effects of other past, present, and reasonably foreseeable future actions, regardless of whether or not the agency or person undertakes them and regardless of land ownership on which other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in addition to effects of other past, present, and reasonably foreseeable future actions, the effects may be significant (e.g. The effects of catastrophic wildfire on a grazing allotment and the watershed as a whole).

The cumulative effects analysis for each alternative is evaluated separately for each resource and may have different spatial and temporal boundaries. Agencies are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined. The analysis of cumulative effects begins with consideration of the direct and indirect effects on the environment that are expected or likely to result from the alternative proposals for agency action. Agencies then look for present effects of past actions that are, in the judgment of the agency, relevant and useful because they have a significant cause-and effect relationship with the direct and indirect effects of the proposal for agency action and its alternatives.

The USDA-Forest Service uses the best available science and most reliable and timely data available. Accuracy from the Combined Data Systems, Geographical Information Systems (GIS), Natural Resource Information System, Forest Inventory, and Analysis Database, Infrastructures Database and other databases vary in accuracy. All attempts to verify and update this information have been made where possible

Further details of analysis beyond which is presented here are available in specialists reports and data sets within the project record.

Background/Fire Regime

Arizona and New Mexico have among the highest incidences of lightning-caused fires in the United States (1). The Rio Chama Project area has seen 195 lightning caused ignitions in the past 37 years. The lightning fire season begins in late April, peaks in June, and runs into October. Maximum lightning fire incidence is above 6,000 feet directly within the Ponderosa zone. The fire season occurs in late spring and early summer in New Mexico. Increasing temperatures and sparse rainfall create extremely dry conditions in spring. By June, weak storm systems typically bring lightning but little rain. July has a high incidence of lightning-ignited fires, but total area burned is less compared to June. By July or August, summer rains usually render fuels too moist to burn well.

Within the past 37 years there have been four wildfires in the Project area that have burned over three hundred acres each, including an 800 acre fire and one 1,000 acre fire. A probability analysis calculated a 22% yearly probability of exceeding a wildfire burned threshold of 1,000 acres. There is a 3% annual probability of having a 1,000 acre fire.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention. There have been five natural fire regimes classified (32). The historical fire regime in southwestern ponderosa pine forests, including the Rio Chama Project Area was primarily frequent low severity surface fire defined as a Fire Regime 1.

A fire regime condition class (FRCC) is a classification of the amount of departure from the natural regime (33). There are three classes based on low, moderate and high departure from the central tendency of the historical regime. The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, mosaic pattern) fuel composition, fire frequency and other natural disturbances. LandFire determined that the Project Area is in a FRCC 2, moderate departure but still outside the natural (historical) range of variability. By reintroducing fire into the Rio Chama Project Area the FRCC 2 would begin to move toward a FRCC 1.

Southwestern ponderosa pine forests have undergone a shift in physiognomy since the late 19th and early 20th centuries. Prior to that time, southwestern ponderosa pines were reported as occurring in open, park like stands with thick grass understories (3). Dendrochronological studies show presettlement densities of ponderosa pine forest in Arizona and New Mexico ranging from 3 to 66 trees per acre (4). Fire return intervals for ponderosa generally ranged from 2 to 12 years for xeric (dry) sites, and up to 15 years for mesic (relatively moist, well drained) sites (2).

Fire frequency in Rocky Mountain ponderosa pine in New Mexico was reduced after Euro-American settlement in the 1880s (5). The explanations for this change include livestock grazing that removed grassy fuels, fire suppression, and climatic factors (4). It is likely no single factor is responsible.

Grazing appears to reduce fire frequency in southwestern ponderosa pine forests by removing grassy understory fuels. Interactive effects of grazing and climate on fire frequency are difficult to determine. Savage and Swetnam (6) suggest that climatic factors play the larger role in determining both fire frequency and ponderosa pine stand structure. They attribute a pulse of

southwestern ponderosa pine regeneration in the early 1900's to a favorable climatic sequence, which, when coupled with the lack of fire to thin the forest stands (patches), resulted in the overly dense stands found today. The narrow diameter pole sized stands of pine in the Project Area originated during this time.

Current fire return intervals are greater than the historical range of variability for southwestern ponderosa pine forests. Magnitude of fire prevalence is greater at lower (Piñon/Juniper woodlands) than higher elevations (spruce fir forests) (8). The expense of excluding fire from southwestern ponderosa pine forests in an active fire year can easily exceed a billion dollars, and these costly attempts at fire suppression are not always successful. In comparison, treatments to restore southwestern pine structure are modest in cost and they restore ecological processes which promote species diversity.

Many acres of southwestern ponderosa pine forests are overly dense, stagnant, and accumulating large quantities of organic litter (dead leaves and woody debris) at the expense of the grassy understory (9). Fire exclusion has led to the build-up of organic fuels and led to severe crown fires in southwestern ponderosa pine and mixed-conifer forests.

The fire regime has changed from frequent surface (ground) fires to large, infrequent, stand-replacing catastrophic crown fires. These catastrophic fires may burn so hot that they sterilize the soil leaving no sources for vegetative regeneration. Sixteen thousand acres in the project area were identified, using the computer model LandFire and remote sensing data, as susceptible to crown fire under extreme fire weather. Field verification indicated that these areas are typically the mixed conifer stands or pine stands with a well developed understory of mixed conifer. Biswell (10) listed several ways in which prescribed burning reduces crown fire hazard in ponderosa pine:

- reduces the volume of dead fuel (organic matter including leaves, grass, and woody debris)
- thins dense thickets of saplings and pole-sized stands (patches)
- keeps shade-tolerant trees out of the understory, thus destroying ladder fuels that enable fires to climb into the forest canopy or crown
- raises the height of green foliage level by needle scorching, making crown fires less likely to occur

Frequent low-severity surface (ground) fires restore ecosystem function by thinning dense stands and reducing woody debris and other organic matter on the forest floor. This can result in (a) increased soil moisture; (b) increased soil temperature (with accompanying rates of increased litter decomposition, soil nutrient cycling, and fine root growth); (c) increased productivity of understory herbs and shrubs; (d) increased basal diameter growth of overstory ponderosa pine (e) and create favorable seedbeds (11). Fire pruning of lower pine branches opens the canopy. Frequent prescribed fire reduces fire hazard with occasional damage to an overstory ponderosa pine (11).

Harrington (11) recommends growing-season (spring or summer) burning in southwestern ponderosa pine forests if the management objective is thinning from below, and fall prescribed burning if stand losses must be minimized. Burning would be conducted during both seasons for the Rio Chama.

Swetnam and Dieterich (12) recommend allowing large (> 3000 acres) prescribed natural surface fires in southwestern ponderosa pine, an approach that is proposed for the Rio Chama Area.

Based upon their fire history research, which showed evidence of mostly extensive but also small fires, they also recommend allowing small and patchy mixed-severity fires in approved areas, subject to the limitations of ownership boundaries, visitor safety, and management and suppression capabilities.

FUELS AND VEGETATION

STAND STRUCTURE AND COMPOSITION AND FIRE BEHAVIOR

Affected Environment

Ponderosa pine is adapted to survive frequent low- to moderate-severity surface fires. Mature trees have thick bark, insulated buds, and a high capacity to recover from crown scorch, all of which provide resistance to surface fires. Ponderosa pine is self pruning, which detours canopy torching.

Low-severity surface fires usually kill southwestern ponderosa pine less than 3 to 5 years of age or less than 6 inches (15 cm) dbh. Mortality in the 6- to 30-inch (15-76 cm) dbh class is not unusual.

Ponderosa pine can withstand extensive scorching as long as buds and twigs, which tolerate higher temperatures than needles, are not badly scorched (13). Ponderosa pine may recover from as much as 90% scorching as long as 50% of buds and twigs survive to maintain shoot growth on defoliated branches (13). Extensive scorching of ponderosa pine crowns may cause mortality within three post-fire years (14). Generally, southwestern ponderosa pine recovery is best after dormant-season scorching; trees scorched in the growing season show poorer survivorship (14).

White fir occurs in a variety of forest and habitat types that evolved with a variety of fire regimes. Thin-barked and resin blistered, with drooping lower branches, young white fir is highly susceptible to fire, and mature trees are only moderately fire tolerant. White fir is an aggressive, shade-tolerant species that would seed into the understory of low-elevation ponderosa pine stands or into mixtures of ponderosa pine, Douglas-fir, quaking aspen, and southwestern white pine (17).

Prescribed burning in areas where white fir is not desired is useful to control its abundance and promote the growth of more desirable species such as ponderosa pine. Burning in some areas may create conditions favorable for suckering (stump and root sprouting) of aspen, oak or Rocky Mountain maple. Planned ignitions have been used to effectively eliminate fire-intolerant species such as white fir and Douglas-fir and to favor more fire-tolerant species such as ponderosa pine (19). This may be useful in areas experiencing high levels of tree mortality due to stress from competition for water and resources in overcrowded stands and subsequent vulnerability to insects and disease. Heavy fuel loadings and well-developed understories of shade tolerant conifers like white fir and Douglas-fir set the stage for stand-replacing crown fires. Frequent low-severity surface fires can create fire tolerant forest conditions, so that fire severity can be reduced. These treatments are sensible where low-severity fire regimes are now supporting high severity fires due to fuel build ups. Not all forest floor fuel is consumed in an initial prescribed burn, and much of the initial volume reduction may be replaced by material killed but not consumed in the initial fire. The fuel ladder is generally broken by the 1st fire, so that a 2nd fire is generally easier to control, 5-10 years after the 1st.

Fire mortality in Rocky Mountain Douglas-fir can occur via cambial damage, root damage, or crown scorch. The effects of fire on Rocky Mountain Douglas-fir vary with fire severity and tree size. Seedlings are most susceptible to fire damage (21). Saplings are often killed by surface fires because their thin bark offers little protection from damage (21). Resin blisters, closely spaced flammable needles, and thin twigs and bud scales are additional characteristics that make saplings more vulnerable to all fires (22).

Gambel oak is a fire-adapted species (26). It responds to fire by vegetative sprouting from the lignotuber and rhizomes.

Fire frequency within Gambel oak stands varies with plant associates. In most associations, little fuel is available for fires to occur in successive growing seasons (27). Fall fires carry most readily through pure Gambel oak stands after leaf senescence but before leaf fall (26). Dry, windy weather readily spreads flames through oak crowns. Gambel oak stands burn well during dry summer conditions, especially on steep, south aspects.

Fire succession: Fire in Gambel oak stands may promote a brief grass-forbs stage depending upon fire intensity and frequency (27). In most situations, Gambel oak sprouts vigorously the 1st growing season following fire (27). If successive fires occur at this stage, Gambel oak stands may be reduced to a grass-forbs stage (27). Repeated fires in Gambel oak ranges may deplete stored resources of rhizomes and lignotubers (27). As sprouts continue to grow, natural thinning occurs, adding dead stems to the fuel. Fire occurring at this stage also sends Gambel oak stands back to an earlier successional grass-forbs stage. In absence of fire, sprouts form young poles. At this stage fires are stand replacement, either creating openings within stands for colonization by sprouts or a complete recycling back to a grass-forbs stage. In the absence of fire, Gambel oak stands reach maturity in 60 to 80 years. Fire response in mature stands is similar to that in young poles. A severe fire would recycle the stand; low-severity fires create openings for sprouts. At 80 years Gambel oak stems die naturally, creating more openings for sprouts (27). With fire exclusion, Gambel oak and ponderosa pine densities have increased.

Aspen occurs on mesic sites and is scattered in small patches within the project area. Aspen stands are over one hundred years old and in decline. Before and during the mid-nineteenth century, fires were more frequent, and larger acreages of quaking aspen were burned, than any time since (29). There has been a reduction of fire rejuvenation of quaking aspen in the West since about 1900 (29). Aspen stands are succeeded by white fir and Douglas-fir on mesic northern aspects. Fire will provide opportunities for aspen regeneration in dense stands predominated by sunlight contesting white fir and Douglas-fir. Aspen is a valuable browse for herbivores in the winter and spring.

Piñon occurs in a variety of habitat types with varying productivity. Because of the diverse site conditions historic fire frequency also varied. There is evidence of both frequent, low-severity fires carried by once-abundant perennial grasses, and less frequent, localized stand-replacement fires during extreme conditions. Fires burned in irregular patterns, producing a mosaic of burned and unburned landscape. On high-productivity sites where sufficient fine fuels existed, fires burned every 15 to 20 years, and on less productive sites with patchy fuels, fire intervals may have been in the range of 50 to 100 years or longer. Fire frequency in piñon communities varies with fuel loads and ignition source that, in turn, vary with habitat type, aspect, topography, stand history, and climatic conditions.

Piñon occurs in many xeric sites with infertile, shallow, rocky soils, where fires are infrequent and unpredictable and depend on exceptional rainfall years that lead to herbaceous growth sufficient to carry fire. The majority of piñon in the Project Area is found on rocky xeric sites and is not expected to burn under conditions when planned and unplanned ignitions would be allowed to burn. The vegetation structure in piñon communities does not carry fire well, and fire return intervals of several hundred years are considered typical. Thin bark and lack of self pruning makes piñon very susceptible to intense fire.

In more mesic areas, north slopes, and canyon bottoms fires may have occurred at 15- to 90-year intervals, maintaining open or patchy stands. This fire frequency favored older stands, since there is little recruitment and seedlings and saplings are more susceptible to fire. Older trees in open canopy structures are able to withstand surface fires that would have occurred with the fine fuel loads presumed to have been present before the huge influx of domestic livestock.

In the absence of fire and the presence of grazing, tree densities have increased and undergrowth is so sparse in many areas that surface fuels do not support fire. Piñon stands are commonly used as natural barriers for managed fire. Increased tree density and subsequent buildup of fuels causes a shift from low-severity to severe fires burning under extreme conditions of hot, dry weather and strong winds. When stands are burned under these conditions, piñon tends to be eliminated from the site and colonizes very slowly.

Methodology

The computer model LandFire uses remote sensing data to determine vegetation composition and stand structure and was used in the analysis. LandFire classifies approximately seventy percent of the area as ponderosa pine, fifteen percent as mixed conifer and fifteen percent as sage, grass and piñon/juniper. The timbered areas have been harvested in the past 30 years under a variety of different cutting prescriptions. Stand structure is variable including open stands of large diameter pine with a mix of size classes, pole stands and scattered openings of grass and sage. Various silvicultural prescriptions have been implemented over the past decades with slash from the most recent treatments still present. Vegetation composition and structure of the timbered areas was stratified into three categories: 1) Stands of ponderosa pine where there is a mix of size classes with a component of large diameter pine, poles and patchy regeneration. These areas have been thinned but to an irregular spatial arrangement. 2) Stands of ponderosa pine where the large old trees have been harvested and the pole and sapling residual have been thinned to an even spacing. 3) Stands of white fir and Douglas-fir with aspen inclusions occurring on mesic sites such as north slopes and canyon bottoms.

Sample points were selected, measured and run through the Forest Vegetation Simulator (FVS) to verify the LandFire model outputs. FVS was used to model current conditions; conditions following moderate intensity managed fire from planned ignitions and conditions following an unplanned ignition and managed wildfire. The managed fire from unplanned ignitions was modeled under slightly more extreme weather conditions than the fire from planned ignitions. The assumption was that an unplanned ignition (lightning) would more likely occur during the dry summer months. Most of the Forests burning using planned ignitions occurs in the cooler and

moister late summer or early fall. Regeneration of ponderosa pine and mixed conifer was assumed to not occur in the modeling in order to better display changes to the existing condition. Modeling allowed aspen to sprout. The FVS and LandFire models do not account for the heterogeneity of fire behavior and fire effects and their outputs should be viewed as estimates of trends and not as precise results.

Effects to Stand Structure and Composition

The following is an analysis of the possible effects of implementing either Alternative A (No Action) or Alternative B (Proposed Action). The analysis for Alternative A includes an assessment of not implementing the project at this time and the anticipated changes in forest structure and composition through natural succession. Analysis is also presented for Alternative A that addresses the possible effects on stand conditions in the event of future catastrophic wildfire.

The analysis addresses the effects on the three major timber categories and stand structures that were identified during the field reconnaissance: 1) Stands of ponderosa pine where there is a mix of size classes with a component of large diameter pine, saplings, poles and patchy regeneration. The poles and saplings have been thinned but to an irregular spatial arrangement. 2) Stands of ponderosa pine where the large old trees have been harvested and the pole and sapling residual have been thinned to an even spacing. 3) Stands of white fir, Douglas-fir and ponderosa pine with aspen inclusions.

Table 6 Effects of Proposed Action

Direct Effects				
Percentage of mixed conifer as a stand component decreases	Basal area decreases, average DBH of mixed conifer/pine increases	Aspen and browse species regenerate, sprouts increase	*SDI decreases	Number of snags/acre increases
Indirect Effects				
Wildfire severity decreases, fire resilience improves as fire adapted species are selected for.	Residual trees better able to survive fire. Landscape fire resilience improves.	Aspen age class distribution improves. Aspen component maintained on the landscape.	Canopy cover decreases. Understory vegetation increases. Tree vigor improves. Resistance to insects and disease improves. Ponderosa pine regeneration encouraged, age class distribution improves.	Increase in large woody debris, replenishment essential for ecosystem function. Increase in fuel loading.

* SDI (Stand Density Index) is a measure of tree competition, also indicative of how open a stand is. See Appendix A. The less the SDI the more open a stand is and the more abundant the under story vegetation.

Effects on Ponderosa pine Stand Structure and Composition of Un-Even Age Class

The following is an analysis of potential changes in stand structure of ponderosa pine where there is a component of large diameter pine and a mix of saplings, poles and patchy regeneration. These stands have been thinned but to an irregular spatial arrangement. The analysis was

performed using FVS modeling of vegetation structure and stand composition for the three sampled strata following the proposed action(s), the No Action Alternative with no fire after 40 years and the No Action Alternative post high intensity wildfire.

Alternative A-No Action

Implementation of Alternative A (No Action) is likely to result in two possible scenarios for future stand conditions; 1) natural succession of the stand without the disturbance of catastrophic wildfire, and 2) the possible effects of a high intensity, high severity wildfire event.

Without a wildfire event ponderosa pine stands would follow natural succession toward an increase in the number of trees, an increase in canopy cover and stand density index. This condition reduces the amount of browse and herbaceous vegetation and leaves the stand susceptible to stand replacement fires and does not meet the objectives of the proposed actions.

Note the effects to stand structure in Alternative A following a wildfire event in today’s forest conditions in Table 6 below.

The No Action with high intensity wildfire shows more severe effects. Few of the smaller diameter trees survive and the distribution of size classes is skewed to the large diameter trees. This stand would be very open with scattered large diameter ponderosa and almost no small trees in the understory. Snags would be abundant.

Modeling the No Action without wildfire over forty years shows increases in basal area and a slight reduction in tree numbers attributable to natural mortality. Average DBH increases as does SDI. SDI is at 37% in forty years which dictates a closed canopy, a sparse herbaceous (grass and forbs) understory and trees that are under drought and nutrient deficient stress increasing susceptibility to insect attack . Snags increase over current numbers but are still not abundant. This stand would be a closed canopy stand with a forest floor covered in pine needles with little understory vegetation.

The table below illustrates the potential changes in stands of ponderosa pine where there is a mix of size classes with a component of large diameter pine, poles and patchy regeneration. These stands have been thinned to an irregular spatial arrangement.

Table 7 Stand Structure and Composition- Ponderosa pine/Mixed Size Class with Large Trees

	Trees per acre	# Snags per Acre > 10” DBH	Basal Area sq/ft	Stand Density Index %* (SDI)	Average Diameter (DBH)	Species Composition
Alternative A	Current Stand Conditions					
	98	1	100	30%	13.7	100% ponderosa pine
Alternative A	No Action No Wildfire (in 40 years)					
	90	2.7	135	37%	16.6	100% ponderosa pine
Alternative A	No Action Post High Intensity Wildfire					
	32	65	63	17%	18.9	100% ponderosa

						pine
Alternative A/B	Unplanned Ignition/Post Managed Fire					
	58	11	89	24%	16.3	100% ponderosa pine
Alternative B	Planned Ignition/Post Managed Fire					
	71	9	84	24%	14.8	100% ponderosa pine

* SDI is a measure of tree competition, also indicative of how open a stand is. See Appendix A. The less the SDI the more open a stand is and the more abundant the under story vegetation.

Alternative B-Proposed Action

The effects of a managed fire from planned ignitions and unplanned ignitions on this forest structure are similar (See Table 6 above). Both actions result in mortality of the smaller diameter trees, reduction of basal areas and SDI and an increase in average DBH from the current condition. The increase in DBH reflects smaller trees being killed with the large diameter trees surviving however there is still a distribution of size classes, many of the smaller diameter trees survive. This stand would appear clumpy with groups of snags and surviving pole and sapling size trees intermixed with large ponderosa pine. The number of snags per acre increases from the current condition and SDI decreases to 24% which means the canopy is open and the understory would be dominated by grasses and forbes

Effects on ponderosa pine stand structure and composition where the large trees have been harvested and the pole and sapling residual trees have been thinned to an even spacing.

The following is an analysis of potential changes in stands structure and composition of stands of ponderosa pine where the large trees have been harvested and the remaining pole and sapling stands have been thinned to an even spacing.

Table 8 Stand Structure and Composition- Ponderosa pine/sapling and pole stand, large trees have been harvested

	Trees per acre	# Snags per Acre > 10" DBH	Basal Area sq/ft	Stand Density Index %* (SDI)	Average Diameter (DBH)	Species Composition
Alternative A	Current Stand Conditions					
	364	0	100	39%	7.1	100% ponderosa pine
Alternative A	No Action No Wildfire (in 40 years)					
	319	.2	175	60%	10.0	100% ponderosa pine
Alternative A	No Action Post High Intensity Wildfire					
	0	20	4	.02%	1.4	Grass/brush

Alternative A/B	Unplanned Ignition/Post Managed Fire					
	117	4	57	20%	9.5	100% ponderosa pine
Alternative B	Planned Ignition/Post Managed Fire					
	188	3	62	23%	7.8	100% ponderosa pine

Alternative A-No Action

For the No Action with high intensity wildfire the model shows 100% mortality and a conversion of the site to grass. Over how large an area 100% mortality would occur is speculative. Snags are abundant for 10-15 years following the fire and then fall over.

Modeling the No Action without wildfire after forty years shows increases in basal area and a slight reduction in tree numbers attributable to natural mortality. Average DBH increases slightly reflecting the slow growth rates due to tree competition. SDI is at 60% in forty years which indicates a closed canopy and sparse under-story with severe competition between trees and a high risk from insect attack. Snags increase slightly over current numbers. This stand under the No Action without wildfire would be a dense homogeneous pine stand with a closed canopy and a forest floor covered in pine needles with little understory vegetation.

Alternative B-Proposed Action

The effects of a planned ignition and unplanned ignitions are similar on forest structure. Both result in mortality of the smaller diameter trees, reduction of basal areas and SDI and an increase in average DBH from the current condition. The increase in DBH reflects smaller trees being killed with larger diameter trees surviving. The stand is still an even aged pole size stand but SDI has decreased to where an herbaceous under story would develop. The number of snags in the above table appears low because the table only captures snags larger than 10 inches DBH. The majority of trees in this representative stand are less than 10 inches DBH. This stand in the aftermath of either of the proposed actions would be a clumpy pole size stand where groups of trees survived interspersed with groups of small snags and a grassy under-story.

Effects on Mixed conifer stands of white fir and Douglas-fir stand structure and composition

The following is an analysis of potential changes in stands structure and composition of stands of mixed conifer stands of white fir and Douglas-Fir Stand Structure and Composition.

Alternative A-No Action

The No Action without wildfire results in stand composition remaining about the same over forty years. Tree numbers decrease over the current condition reflecting natural mortality. Average DBH increases over the 40 years reflecting diameter growth of .07 inches a year. Aspen is still present but is not regenerating. The SDI in 40 years is at 56%, just below the SDI level where density induced tree mortality occurs due to competition between the trees. Little or no herbaceous vegetation would be present on the forest floor.

Catastrophic large scale fires were rare in the presettlement southwest; however, they are increasingly probable due to successful suppression since the 1890s. Failure to implement planned ignitions and extinguishing unplanned ignitions has promoted a forest structure and composition that is unsustainable across the landscape. An analysis of the current forest structure and composition has found that much of the project area is susceptible to catastrophic crown fire. As ecological succession ensues, catastrophic wildfire will continue to threaten without the benefit of planned ignitions. A catastrophic fire may result in the sterilization of the soil, a lack of biotic regeneration and erosion. The sterilized site would revert to its initial ecological succession stage after a catastrophic fire disturbance. Large landscape scale catastrophic fire is the most destructive as it amplifies the decades required for recovery.

The table below illustrates stand conditions of mixed conifer stands occurring on mesic sites such as north slopes and canyon bottoms. These areas prior to fire exclusion historically were predominately ponderosa pine but have been encroached by white fir and Douglas fir. Inclusions of aspen are scattered and tend to be small and localized.

**Table 9 Stand Structure and Composition-
Mixed conifer stands of White fir and Douglas-Fir Stand**

	Trees per acre	# Snags per Acre > 10" DBH	Basal Area sq/ft	Stand Density Index %* (SDI)	Average Diameter (DBH)	Species Composition
Alternative A	Current Stand Conditions					
	567	1	142	41%	6.8	53% white fir 36% Douglas fir 3% aspen 3% ponderosa pine
Alternative A	No Action No Wildfire (in 40 years)					
	477	1.8	241	56%	9.6	57% white fir 33% Douglas fir 7% aspen 2% ponderosa pine
Alternative A	No Action/Post High Intensity Wildfire					
	316	109	4	.02%	1.4	100% aspen
Alternative A/B	Unplanned Ignition/Post Managed Fire					
	1383*	29	73	28%	3.1	9 % white fir 5 % Douglas fir 83 % aspen 2% ponderosa pine
Alternative B	Planned Ignition/Post Managed Fire					
	1259*	29	91	33%	3.6	5 % white fir

						2 % Douglas fir 91 % aspen 2% ponderosa pine
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* This figure includes aspen sprout

Alternative B-Proposed Action

The effects of a planned ignitions and unplanned ignitions are similar on this forest structure. Both result in mortality of the smaller diameter trees, reduction of basal areas and a decrease in the SDI. Average DBH decreases from the current condition but this is explained by the aspen regeneration and the increase in the number of small diameter aspen sprouts. Species composition shifts with a decline in the percentage of white fir and Douglas fir in the stand. Small diameter Douglas-fir and white fir are easily killed by low and moderate intensity fire. The increase in the number of snags reflects this mortality. Ponderosa pine shows no percentage decline as a stand component. Aspen however increases as a component reflecting its response to fire. SDI is still at a level that indicates the stand is predominately closed canopy.

Observations of past planned ignitions on the Santa Fe National Forest shows fire induced mortality in these mixed conifer stands tends to be very patchy with unburned islands intermixed with dead patches of conifer and clumps of aspen regeneration. Landscape patchiness promotes biodiversity. High intensity wildfire converts the stand to aspen. Snags are abundant for 10-15 years following the fire then fall over.

DIRECT AND INDIRECT EFFECTS OF FIRE BEHAVIOR

The following is the effects analysis based on FVS modeled results of fire behavior and fuels for current conditions of the three sampled strata, conditions following the proposed action(s) and the No Action alternative with and without high intensity wildfire.

Effects analysis on fire behavior in stands of ponderosa pine where there is a mix of size classes of larger diameter pine, saplings, poles and patchy regeneration. These stands have been thinned but to an irregular spatial arrangement.

Alternative A-No Action

The No Action (after 40 years) with no wildfire shows little change in the Crowning Index (CI) from the current value. The stand remains dense with little change in stand structure. The torching index (TI) increased for the No Action which reflects natural pruning of the lower branches of the trees. As the lower branches of trees die they gradually fall off and this natural pruning raises the crown to base height and the TI.

Table 9 below illustrates fire behavior for each alternative in stands of ponderosa pine where there is a mix of size classes of large diameter pine, poles and patchy regeneration. These area have been thinned but to an irregular spatial arrangement.

Table 10 Fire Behavior- Ponderosa pine/Mixed Size Class with Large Trees

	Flame Length (ft)	Crown Fire Hazard	Torching Index* (mph)	Crowning Index* (mph)	Canopy Base Height (ft)	Fuel Model
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		Rating*				
Alternative A	Current Stand Conditions					
	2-6	LOW	53	41	36	Grass (2) Pine Litter (9)
Alternative A	No Action Post High Intensity Wildfire					
	3-7	LOW	64	63	52	Grass (2) Pine Litter (9)
Alternative A	No Action No Wildfire (after 40 years)					
	2-6	LOW	61	42	38	Pine Litter (9)
Alternative A/B	Unplanned Ignition/Post Managed Fire					
	2-7	LOW	73	46	41	Grass (2) Pine Litter (9)
Alternative B	Planned Ignition/Post Managed Fire					
	2-7	LOW	72	45	41	Grass (2) Pine Litter (9)

*Crowning Index (CI) is the 20 ft wind speed necessary to sustain a crown fire once a fire has reached the canopy. The higher the CI is, the less the crowning hazard

*Torching index (TI) is the wind speed required to initiate crown fire through torching of individual trees. The higher the TI is, the less the torching hazard.

*Crown Fire Hazard Rating **Appendix II**

Alternative B-Proposed Action

The crown fire hazard rating for this stratum is low reflecting the open condition of the stand, absence of “ladder” fuels and the clumpy distribution of the trees. Crown fuel continuity is not continuous which reflects in the high value of the crowning index (CI). When trees or groups of trees are spaced far apart it’s difficult for fire to jump from one tree to the next. A crowning index of 41 miles per hour means it would take a 41 mile per hour wind (wind speed measured 20 feet from the ground) to carry a crown fire through this stand. Torching index (TI) is an indicator of the amount of “ladder” fuels present, also measured by the crown to base height. Ladder fuels refer to the small trees and live branches that when ignited carry fire from the surface of the forest into the tree crowns. The lower the ladder fuels are to the ground (crown to base height) the less wind it takes (torching index) to initiate a fire in the tree crowns. The model indicates that it would take a 53 mile per hour wind to push a fire into the tree crowns.

The effects of a planned ignitions and unplanned ignitions are similar on the TI and CI. The torching index increases from 53 mph to 72-73 mph. A fire burning in surface fuels on the forest floor scorches and kills small trees and lower branches of large trees thus reducing ladder fuels and raising the crown to base heights. With higher crown to base heights it takes higher wind speeds to drive a fire into the crowns of the trees.

Crowning index (CI) is dependent upon how much fuel (the needles and small branches) there are in the crown layer of the trees. If trees are close together with no interruptions in the fuel continuity it takes a low wind speed to carry a fire from one tree to the next. The planned and unplanned ignitions with multiple objectives would not burn hot enough to kill many trees and

would not open the stand. The CI would not appreciably change. The CI would increase after the high intensity wildfire reflecting the number of trees killed during the fire.

Flame lengths of surface fires increased from the current conditions following the planned ignitions, resource benefit and wildfire scenarios. FVS models fire behavior using wind speeds measured 20 feet from the ground. Wind speeds at the surface, which influences surface fire behavior, are much less than 20 ft winds. Surface winds are slowed down by obstacles such as trees and other vegetation as well as friction with the forest floor. Winds travel faster through an open stand or meadow than they do through a dense forest.

Wind influences fire behavior. The stronger the wind blowing on a fire the more intense (the greater the flame length) a fire burns. The increase in flame lengths reflects the more open stand condition following the planned ignitions and wildfires with multiple objectives. After the planned and unplanned ignitions there were less small trees and branches to slow the wind. The same effects on flame lengths can be seen after the wildfire scenario. There was no change in flame lengths in the No Action without wildfire.

The following is an effects analysis on fire behavior in stands of ponderosa pine where the large old trees have been harvested and the pole and sapling residual have been thinned to an even spacing.

Alternative A-No Action

The No Action with high intensity wildfire converted the forest to grass. Surface flame lengths increased reflecting a grass fuel model with no trees to reduce the wind speeds.

The No Action (after 40 years) with no wildfire shows a reduction in the CI from the current value. The stand increases in density with the SDI increasing to 60% and basal area to 175 sq ft. This dense stand would carry a fire through the crowns at a low wind speed. The TI increased for the No Action with no wildfire which reflects natural pruning of the lower branches of the trees. As the lower branches of trees die they gradually fall off and this natural pruning raises the crown to base height and the TI. Surface flame lengths stayed the same.

Table 11 Changes in fire behavior for alternatives in stands of ponderosa pine where the large old trees have been harvested and the pole and sapling residual stand has been thinned to an even spacing.

	Flame Length (ft)	Crown Fire Hazard Rating	Torching Index* (mph)	Crowning Index* (mph)	Canopy Base Height (ft)	Fuel Model
Alternative A	Current Stand Conditions					
	2-5	MODERATE	48	21	25	Timber litter (9)
Alternative A	No Action/Post High Intensity Wildfire					
	3-10	NOT APPLICABLE	0	0	0	Grass (2)
Alternative A	No Action No Wildfire (after 40 years)					
	2-6	MODERATE	69	19	30	Timber Litter (9)
Alternative	Unplanned Ignition/Post Managed Fire					

A/B						
	2-6	MODERATE	58	23	28	Grass (2) Timber litter (9)
Alternative B	Planned Ignition/Post Managed Fire					
	2-6	MODERATE	54	28	26	Grass (2) Timber litter (9)

Alternative B-Proposed Action

The crown fire hazard rating remained unchanged following planned ignitions and unplanned ignitions. Crowning index and torching index increased but not enough to improve the hazard rating. The increases in CI reflect the thinning of the stand with fire and the increase in the TI with the reduction of ladder fuels through scorching.

The No Action with high intensity wildfire converted the forest to grass. Surface flame lengths increased reflecting a grass fuel model with no trees to reduce the wind speeds.

The No Action (after 40 years) with no wildfire shows a reduction in the CI from the current value. The stand increases in density with the SDI increasing to 60% and basal area to 175 sq ft. This dense stand would carry a fire through the crowns at a low wind speed. The TI increased for the No Action with no wildfire which reflects natural pruning of the lower branches of the trees. As the lower branches of trees die they gradually fall off and this natural pruning raises the crown to base height and the TI. Surface flame lengths stayed the same.

Effects analysis on fire behavior in stands of white fir and Douglas-fir occur on mesic sites such as north slopes and canyon bottoms. White fir and Douglas-fir have encroached into the more xeric (low moisture) sites and have become a major understory component in some ponderosa pine stands. Inclusions of aspen are scattered and tend to be small and localized.

Alternative A-No Action

The No Action with high intensity wildfire converted the forest to grass. Surface flame lengths increased reflecting a grass fuel model with no trees to reduce the wind speeds.

The No Action (after 40 years) with no wildfire shows the CI remaining the same as the current value. The hazard rating improved from extreme to severe due to the TI increasing which reflects natural pruning of the lower branches of the trees in this dense stand. As the lower branches of trees die they gradually fall off and this natural pruning raises the crown to base height and the TI. Surface flame lengths

Table 12 Changes in fire behavior for Alternatives in stands of mixed conifer with ponderosa pine and aspen component.

	Flame Length (ft)	Crown Fire Hazard Rating	Torching Index* (mph)	Crowning Index* (mph)	Canopy Base Height (ft)	Fuel Model
Alternative A	Current Stand Conditions					
	2-4	EXTREME	7	9	4	Timber litter (9)

Alternative A	No Action/Post High Intensity Wildfire					
	3-10	NOT APPLICABLE	0	0	0	Grass (2)
Alternative A	No Action No Wildfire (after 40 years)					
	2-5	SEVERE	19	9	6	Timber litter (10)
Alternative A/B	Unplanned Ignition/Post Managed Fire					
	2-6	MODERATE	42	24	19	Timber litter (9) Grass (2)
Alternative B	Planned Ignition/Post Managed Fire					
	2-6	MODERATE	51	16	21	Timber litter (9) Grass (2)

Alternative B-Proposed Action

The crown fire hazard rating improved from extreme to moderate following manage fire from planned ignitions and unplanned ignitions. Crowning index and torching index increased. The increases in CI reflect the thinning of the stand with fire and the increase in the TI with the reduction of ladder fuels through scorching. Surface flame lengths increased due to the more open condition of the area following treatment.

CUMULATIVE EFFECTS TO STAND STRUCTURE, COMPOSITION AND FIRE BEHAVIOR

This cumulative effects analysis considers the landscape encompassed within the project area, the Coyote Ranger District as a whole, the Rio Chama Canyon corridor, the Golondrino Mesa and northern portions of the Cuba Ranger District, and Mesa de las Viejas on the Carson National Forest to the east. Projects that have been implemented in the last five years, those in the planning stages and those planned in the foreseeable future which reduce the potential for catastrophic wildfire through mechanical thinning, planned ignitions (prescribed fire), or wildfires with multiple objectives are considered.

The Table below lists projects that have been conducted in the last ten years are in the process of implementation or are planned for the near future.

**Table 13 Cumulative Effects Project List
Coyote and Cuba Ranger Districts**

Name	Activities	Size	Status	District
Camino/Corral Forest Health and Wildlife Habitat Improvement Project	Mechanical Thinning and Prescribed Fire	~4,000 acres	Implementation	Coyote
Mesa Alta Forest Health and Meadow Restoration Project	Mechanical Thinning and Prescribed Fire	~750 acres	Implementation	Coyote
Gallina WUI Phase I and II	Mechanical Thinning and Prescribed Fire	~5,200 acres	Implementation	Coyote

Mesa Poleo WUI Phase I and II	Mechanical Thinning and Prescribed Fire	~4,800	Implementation	Coyote
Golondrino Planned ignitions Project	Mechanical Thinning and Prescribed Fire	~4,200 acres	Planning	Cuba

Note: The projects listed above in Table 12 are considered in all cumulative effects analysis in this assessment.

PLANNED IGNITIONS

SAFETY AND POSSIBLE LOSS OF CONTROL

The following is an assessment of the potential for a planned ignition to become out of control and become a threat to personal property and forest resources. This assessment relies on the accomplishment of planned ignition over the last five years on the Coyote Ranger District, Santa Fe National Forest. Data indicating initial attack of unplanned ignitions caused by human and lightning during what would be considered extreme fire conditions that would have likely produced catastrophic fire effects in the last five years is also provided.

Alternative A No Action

Implementation of Alternative A would not initiate planned ignitions at this time; therefore, in the near-term (3-5 years) there would be no increase in the potential for a planned ignition to grow out of control. (Unplanned ignitions) are likely to occur within the project area; however, (some of these fires if they fall within the guidelines of the Forest Land/Resource Management Plan would be managed to move the landscape towards a desired condition. It would be unlikely that these fires would grow out of control.

Over the long-term (>5 years) not implementing (planned ignitions) would likely increase the potential for (unplanned and planned ignitions) growing out of control as tree densities, ladder fuels and forest succeeds toward closed canopy conditions without the benefit of (planned ignitions and unplanned ignitions with a resource objective of management), or mechanical thinning. **Please refer to the previous analysis in the Forest Structure and Composition, and Fire Behavior Analysis.** As the forested landscape grows more dense, it would become more difficult to treat without mechanical treatments.

Those forested stand in the project area that are currently in Fire Regime Condition Class I would grow into FRCC II, and II's into FRCC III. These conditions would be unsustainable due to the climate, vegetation type and the role natural fire has played across this landscape. Under these conditions the likelihood of a fire occurrence during extreme fire conditions that would grow into catastrophic fire behavior is likely. The resulting hazard and threats to fire fighting personnel, private land, forest resource, and biotic diversity could be high.

In the case of (unplanned ignitions) (the Forest would follow) **The Guidance for Implementation of Federal Wildland Fire Management Policy**; February 13, 2009 (by assessing the situation, analyze hazards, risks and benefits, define implementation actions, and document decisions and rational for those course of actions. The information would then be published in Response Level 1, 2, or 3 in the Wildland Fire Decision Support System (WFDSS)).

Alternative B

The Coyote Ranger District, Santa Fe National Forest, has initiated 4,331 acres of planned ignitions, and 3,305 acres of unplanned ignitions with a management objective between 2004 through 2009 resulting in the reduction of fuels and the threat of wildfire on approximately 7,636

acres. Therefore; it is unlikely that planned ignitions or unplanned ignitions that are allowed to burn would result in an uncontrolled wildfire.

Prior to implementation of a (planned ignition) a planned ignitions burn plan is written using The Interagency Prescribed Fire Planning and Implementation Procedures Guide: July 2008. The purpose of this guide is to provide consistent interagency policy, establish common terms and definitions and identify planning and implementation processes for planned ignitions. The goals for planned ignitions are:

- Provide for firefighter and public safety as the first priority.
- Ensure that risk management is incorporated into all planned ignitions planning and implementations.
- Use planned ignitions in a safe, carefully planned, and cost efficient manner.
- Reduce wildfire risk to communities, municipal watersheds and other values and to benefit, protect, maintain sustain, enhance natural and cultural resources.
- Utilize planned ignitions to restore natural ecological processes and functions, and to achieve land management objectives.

The guide identifies 21 elements that need to be address in a burn plan including other fire fighting personnel and resources in the immediate geographic area (Forest, Agency, etc) incase a planned ignitions grows out of prescription. In this way, the agency identifies the necessary resources to assure safe implementation of the burn. In the case of an unplanned ignition, a formal process of review is initiated involving an interdisciplinary team of specialists to assess the risk of allowing a fire started by lightning to burn or not. The Guidance for Implementation of Federal Wildland Fire Management Policy provides the process by which (unplanned ignitions) are allowed to burn or suppression is employed.

WILDLIFE

MANAGEMENT INDICATOR SPECIES, THREATENED, ENDANGERED AND SENSITIVE SPECIES, AND MIGRATORY BIRDS

The following is an analysis of the potential effects to Management Indicator Species (MIS), Threatened, Endangered and Sensitive Species, and Migratory Birds common to the project area. For complete reports for Management Indicator Species, Threatened, Endangered and Sensitive species and for the Migratory birds please refer to the project record.

There are no threatened, endangered or sensitive species present in the project area; therefore there would be no effect with implementation of either alternative. No consultation with the U.S. Fish and Wildlife Service was required.

Alternative A-No Action

This analysis serves as the effects analysis for the No Action alternative for all remaining species (MIS, TE&S and Migratory Birds) in this section. The analysis addressed the possible effects to wildlife habitat and wildlife populations common to the project area without planned and unplanned ignitions.

Implementation of the No Action Alternative would not implement any activities to reduce fuels in the project area, and would suppress most lightning starts. Not allowing fire to play a role in reducing ladder fuels would allow growth of all vegetation. Grazing animals and large ungulates present in the project area would continue to exert grazing pressure on forage and browse species.

No temporary human disturbances would occur to wildlife or wildlife habitat in the form of activities associated with planned ignitions. Changes to habitat would be increased hiding cover and reduced foraging areas as trees grow in size and number. Wildlife populations would temporarily remain the same until an uncontrolled wildfire burns large acreages. Uncontrolled catastrophic wildfire would destroy roost trees, nesting cover, nest trees, den sites and quality forage areas. Large scale crown fire could create widespread standing snags. This would create large amount of nesting and feeding habitat and a temporary increase in cavity nesting birds. This would change as the as the snags fell and wood feeding insect population dropped. Herbaceous forage would recover in two or three years, but it would take decades for mature trees to return. Squirrels, tree nesting birds, and cavity nesting birds would not be able to breed in the area for many decades.

Developed waters (troughs, tanks, or springs) and other improvements such as fences, corrals, or livestock trails could be destroyed by wildfire and become unusable by wildlife (no water available). Earthen tanks with spillways could breach due to excessive runoff and sediment production due to a lack of vegetative cover, rendering them unable to store water for wildlife and livestock. For example; large animals such as elk can drink 5 gallons a day in hot weather. Nursing does and elk cows must have water to support their fawns and calves. Elk would travel further to find water or abandon areas currently used if water was no longer available. Catastrophic fire could lead to a decrease in the current population. All wildlife would travel further to find water or abandon areas currently used for feeding if sufficient water was no longer available.

Forested lands burned through a catastrophic wildfire could remain as brush fields and grasslands for decades, and would no longer support the current array of species. Populations of larger, mobile wildlife would be highly stressed in unfamiliar areas and encounter territorial behavior of individuals currently occupying an area. Some populations would be expected to decrease due to these conditions. Small animal habitat would be destroyed and most would perish without sufficient food sources in the immediate vicinity. Burned fences could become hazardous wire tangles for wildlife which could trap or injure individual animals. Repairing such improvements would be costly and take several years when and if funding became available.

When compared to Alternative B, implementing the Alternative A would leave the landscape vulnerable to wildfire which could result in a large loss of wildlife habitat. When comparing the effects of planned ignitions and wildfires with multiple objectives to the effects of wildfire; implementation of the Alternative A No Action could result in severe negative effects to wildlife and habitat over a relatively large landscape with effects that could last for decades.

Alternative B-Proposed Action

Implementation of Alternative B would result in a reduction in the potential for crown fire and catastrophic wildfire across the project area and landscape. Forested stands that are presently susceptible to crown or catastrophic fire would be reduced from Fire Regime Condition Classes 3 and 2 to Classes 2 and 1.

When Compared to Alternative A (No Action) implementation of this project (Alternative B) would produce the most improvement in forest health while reducing the potential for catastrophic wildfire.

MANAGEMENT INDICATOR SPECIES (MIS)

Methodology

Populations of wildlife are extremely difficult to quantify; and in some cases can vary substantially from year to year. Environmental factors can dramatically influence recruitment of young and survival of adults. A precise figure on the number of animals is very difficult if not impossible to attain; and would only be valid for a short time period. In order to estimate populations for MIS species we evaluated a number of sources for each species; and then ranked the population into descriptive categories. Populations of MIS species would be expected to fluctuate within a category from year to year. However, we would not expect a species to switch from category to category without some long-term change in environmental conditions. For instance a change in ranking from uncommon to rare would be a cause for concern; and would warrant intensive evaluation of a species. A ranking system is based on the predicted number of breeding pairs; or adult females depending on which is most appropriate for the species addressed.

Habitat descriptions for the MIS below are taken from the 2006 MIS Assessment. Aspen acreages are taken from GIS data which reflects existing cover type and not potential vegetation as based on the Terrestrial Ecosystem Unit Report. Habitat trend Forest-wide is addressed in the 2006 report as well.

Estimates of populations for MIS species were evaluated from a number of sources for each species and then ranked into descriptive categories for the Santa Fe National Forest (Santa Fe National Forest Management Indicator Species Assessment 2006). Populations of MIS species would be expected to fluctuate within a category from year to year.

Table 14 Ranking of MIS Forest-Wide

Category	Breeding Pair/Adult Female
Not Present	0
Extremely Rare	1-10
Rare	10-100
Uncommon	100-1,000
Common	1,000-10,000
Abundant	10,000-100,000
Very Abundant	>100,000

Refer to **Santa Fe National Forest Management Indicator Species Report** (May 2006) for additional information. All baseline information is taken from that report. Other information is from field knowledge of the area and professional judgment.

The following Management Indicator Species were designated in the Santa Fe National Forest Plan EIS.

Table 15 Management Indicator Species

Common Name	Scientific Name	Designations
Merriam’s Turkey	<i>Meleagris gallopavo</i>	
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	
Hairy Woodpecker	<i>Picoides villosus</i>	
Mourning Dove	<i>Zenaida macroura</i>	
Mexican Spotted Owl species	<i>Strix occidentalis lucida</i>	FWS Threatened

Elk	<i>Cervis elaphus nelsoni</i>	
Rocky Mountain Bighorn Sheep	<i>Ovis canadensis Canadensis</i>	FS Sensitive Species
Rio Grande Cutthroat Trout	<i>Oncorhynchus clarkii virginalis</i>	FS Sensitive Species and FWS Candidate

Affected Environment

The project area is a total of approximately 92,812 acres of the Santa Fe National Forest and constitutes 5% of the total amount of Santa Fe National Forest land base of 1,769,129 acres. The proposal is to burn existing heavy slash from past activities and thin small diameter trees 6” or less. The activities would take place on 51,604 acres. Activities would take place outside of Wilderness. Planned ignitions and unplanned ignitions are proposed on approximately 91,000 acres. Approximately 500 acres would be mechanically thinned. The project includes wildfires with multiple objectives in the Chama River Canyon Wilderness.

SPECIES EVALUATION OF PROJECT AREA

The following table provides the list of selected MIS and rationale for inclusion or exclusion from this assessment.

Table 16 MIS Present

Common Name	Assessed	Rationale
Merriam’s Turkey	Included	Habitat and Species present in area
Pinyon Jay	Included	Habitat and Species present in area
Hairy Woodpecker	Included	Habitat and Species present in area
Mourning Dove	Included	Habitat and Species present in area
Mexican Spotted Owl	Not assessed	Species not present in area.
Elk	Included	Habitat and Species present in area
Bighorn Sheep	Not assessed	Habitat and Species not present in area.
Rio Grande Cutthroat Trout	Not assessed	Habitat and Species not present in area. No streams with fish in area.

Direct and Indirect Effects to Management Indicator Species

Affected Environment-Merriam’s Turkey

The Merriam’s turkey is the most common subspecies of turkey. It is found in many mountainous areas of northern New Mexico. The bird utilizes ponderosa pine, a source of mast and its favorite roosting tree. The ponderosa pine is an essential component of its permanent habitat, while surface water is a requirement. Turkeys prefer to roost in tall mature or over-mature ponderosa pines with relatively open crowns and large horizontal branches starting at 20 to 30 feet from the ground. Trees with a diameter at breast height (DBH) of over 14 inches are used as roosts. These trees must have excellent protection from the wind, and must be located in sites with an open ridge or rocky ledge nearby to provide ease in entering and exiting the roost site. Hens normally nest within ½ mile radius of water.

A healthy ponderosa pine understory provides the turkey cover, as well as forage. Turkeys forage in grasslands, brush communities, deciduous tree-brush and in ponderosa pine. They eat grasses and grasshoppers in the summer. They eat acorns and mature ponderosa pine seeds in fall. Tall

grasses are eaten in the winter when the heavy snows come. Piñon nut crops are the turkey's "corn" of the southwestern forest. The area has suitable habitat for the Merriam's turkey, of high quality herbaceous ground vegetation. During the spring and summer months, turkeys depend on the sprouting herbage and insects for forage. Currently much of the project area within ponderosa pine ranges from open to very dense stands.

Turkeys are very wary, secretive; and avoid contact with people. The turkey population would be ranked as common (1,000-10,000 individuals). This population would fluctuate from year to year based on various environmental conditions and hunter success; and would not be expected to change as a result of burning activity. The population trend on the Forest has been rated as stable or increasing. Populations in the project area are expected to follow this same general trend because habitat should be improved.

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

Implementation of fire via Alternative B should have a neutral to beneficial effect on habitat conditions for turkey. Although there could be some temporary and minor disturbance to individual turkeys, from burning activities this would not negatively affect their ability to reproduce or survive. Planned ignitions should take place outside of nesting season April 15 through May 30 if at all possible. Burning would be limited to between 2,000 to 6,000 acres a year within the project area and make a complete cycle through the area over a period of a few years. Turkey would move to areas where activity is not occurring. Turkey have a wide diet of insects, seeds, flowers, buds, etc., and would forage on these items as soon as new growth returns. Turkeys are very mobile when not nesting, so all the potential negative effects would be minor, and would not impact the population or contribute to a downward trend in the population.

This project is likely to be neutral or have beneficial effects on the overall population trends for turkeys in the project area because more forage should be available throughout their range in the project area. The potential for incidental loss of a turkey nest would not likely be measurable above the normal population fluctuations that occur from year to year. Implementation of this project is not likely to measurably influence the status or trend of this species.

Table 16 below illustrates turkey habitat by vegetation type and the percent of which affected by proposed actions.

Table 17 Turkey Habitat and Percent Affected

Vegetation Type	Total Acres on Forest	Acres within Project Area	Percent of Habitat Affected
Ponderosa Pine	362,227	28745	7
Total Acres	362,227	28745	7

Affected Environment-Pinyon Jay

Pinyon jays nest mainly in stands of piñon-juniper. It needs open woodlands for nesting and an adequate supply of seeds, especially nuts (Terres 1980). They are gregarious and breed in

colonies up to 150. They spend the winters in large flocks of 10's or 1,000's moving in search of piñon stands with a successful crop of piñon nuts that are a primary food source along with other seeds, fruits and insects.

Stands of piñon-juniper provide the habitat for the pinyon jay on the Santa Fe National Forest. Stands in the project area are not the best suitable habitat for this species. They tend to nest where piñon-juniper is more abundant.

Pinyon jay nesting populations are stable or decreasing based on Breeding Bird Surveys in New Mexico. The species occupies New Mexico as a breeding and winter resident. In the project area pinyon jay would be ranked as uncommon (10-100). Pinyon jays are variably residents in mainly middle elevation areas containing piñon-juniper woodlands almost statewide, and are considered uncommon to locally abundant (Ehrlich 1988). Even within these habitats, however, their occurrence may be very unpredictable and seasonally sporadic. In mass movements during years of poor seed crop especially piñon nuts, flocks may move hundreds of miles (USDA Forest Service 1991). Due to the unpredictable movements of these birds, population estimates for project level analysis is not possible.

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

Nesting habitat of the pinyon jays would not be affected because trees would not be removed or affected. Although there could be some temporary and minor disturbance from activities effects to individual pinyon jays, causing them to move away from the disturbance for a short period of time, this would not negatively affect their ability to reproduce or survive because it would be outside of breeding season. Pinyon jays have declined up to 80% of the previous populations due to West Nile Virus (pers. comm. Bagne 2007) (pers. comm. Fair 2007). Other effects are the widespread mortality of piñon due to drought and attack by Ips beetles over the last several years since 2001. The proposed action would not impact the population or contribute to a downward trend in the population.

This project would have a neutral or beneficial effect to the pinyon jay population in the project area. Effects are not likely to be measurable above the normal population fluctuations that occur both seasonally and from year to year. Implementation of this project is not likely to measurably influence the status or trend of this species.

Table 18 Pinyon Jay Habitat and Percent Affected

Vegetation Type	Total Acres on Forest	Acres within Project Area	Percent of Habitat Affected
Piñon/Juniper	382,031	7576	2
Total Acres	382,031	7576	2

Affected Environment-Hairy Woodpecker

The Hairy woodpecker is an indicator species for the presence of snags and down logs. The species is a forest generalist, keying in on available snags and live aspen. Nests are primarily in trees averaging 17 inch DBH and approximately 60 feet high. It forages primarily on tree trunks

averaging 17 inch DBH and >30 feet high. Down logs are important to support insect populations for foraging. Scott and Church (1988) found that hairy woodpecker densities were negatively correlated with aspen basal area in west-central Colorado. Removal of snags, or future snags and down logs increases the probability of decreased population numbers of Hairy woodpeckers.

Large trees, which are future down logs and snags, are maintained across the Santa Fe National Forest in accordance with the Forest Plan and the background matrix of current snags and down logs. Snags and down woody debris comprise an important element to the background matrix of the forested landscape. Most of the trees are 80-100 years old and not overly mature. The forest habitat would not be changed by the machine piling or the planned ignitions proposed. Large logs would be retained while old piles of slash (small trees and tops) would be removed. Risk of crown fire would be reduced and future large trees protected.

Surveys specifically designed to calculate the number of hairy woodpeckers in the project area have not been completed. Based on the habitat available and the Stahlecker et al (1989) study in similar habitat types, the area could support a maximum population of approximately 800 breeding pairs of hairy woodpeckers. This population would be ranked as common (1,000-10,000).

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

No change in large tree density would occur under the proposal because no large trees are to be cut. No effects to individual woodpeckers are expected. The action proposed would be neutral to the species or slightly beneficial if some trees are burned and become snags for future nest trees.

This project would have a neutral to slightly beneficial impact to the Hairy woodpecker. Potential for incidental loss of a cavity nest tree is low. Replacement trees could be created by occasional torching of individual large trees. No change to the overall population trend for Hairy woodpecker in the project area is expected. Implementation of this project would not influence the status or trend of this species.

Table 19 Hairy Woodpecker Habitat and Percent Affected

Vegetation Type	Total Acres on Forest	Acres within Project Area	Percent of Habitat Affected
Aspen	47,736	2	0
Mixed Conifer (White fir, Douglas fir, Blue Spruce)	434,657	8687	2
Ponderosa Pine	362,227	28745	8
Total Acres	802,612	37434	10

Affected Environment-Mourning Dove

Mourning dove is found across North America in many types of habitat including most forest types. It is wide spread except in the Arctic and closed forests. It is abundant and

increasing near farms and suburbs. It frequents backyard feeders, suburbs and towns. They are common to abundant in most counties in New Mexico.

Throughout the Santa Fe National Forest, Mourning dove habitat is abundant. This species is primarily found in lower elevations of the Forest, however, they are found in Douglas-fir, ponderosa pine, spruce-fir, aspen, and piñon-juniper forest types. Coniferous trees and ground sites are preferred early in the year before deciduous trees have developed leaves. In all situations however, abundant food and water must be available within 20-30 km. These habitats and grassland habitats found on the Forest meet the feeding requirements for the Mourning dove. Under burning in ponderosa create favorable feeding areas. The abundance of nesting and cover opportunities on the Santa Fe National Forest contribute to maintaining viable populations of Mourning dove.

Mourning dove nesting populations are stable or decreasing based on Breeding Bird Surveys in New Mexico. This species occupies New Mexico as breeding resident and can be found year round in the southern counties. No threats to the Mourning dove are known except for human encroachment or over hunting. The Mourning dove would rank as common (1,000-10,000) based on the amount of habitat available. New Mexico Natural Heritage Program ranked populations of Mourning dove in New Mexico as “Demonstrably Secure” in October 1997. It is a multiple brooder and the most abundant dove in North America and the most widely hunted and harvested game bird. Natural mortality factors include predation of adults and free-flying young by avian and mammalian predators and destruction of eggs and nestlings.

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

Although there could be some temporary (1-3 year) and minor disturbance effects from burning activities to individual doves, causing them to move away from the disturbance for a short period of time this would not negatively affect their ability to reproduce or survive because the activities would be outside of breeding season. Most doves would have migrated during the time of year burning takes place.

This project would have no impacts on the overall population trends for mourning dove in the project area. The potential for incidental loss of a mourning dove nest would not be measurable above the normal population fluctuations that occur from year to year. Implementation of this project is not likely to measurably influence the status or trend of this species.

Table 20 Morning Dove Habitat and Percent Affected

Vegetation Type	Total Acres on Forest	Acres within Project Area	Percent of Habitat Affected
Grass, Oak, Sagebrush	118,171	6040	5

Deciduous Riparian	9,254	0	0
Piñon/Juniper	382,031	7576	2
Ponderosa Pine	362,227	28745	8
Total Acres	871,683	42361	15

Affected Environment-Rocky Mountain Elk

Rocky Mountain elk inhabit most forest types with good forage and cover. The ungulates utilize a variety of habitat types. They appear to be extremely adaptable to both secondary successional and specific successional vegetation types. Habitat types differ in value to elk due to aspect, elevation, snow depth, lack of water availability and/or vegetation components. Canopy closure due to the suppression of fire has occurred from and reduced understory forage production. Since elk are grazing animals this limits the amount of available habitat. The area provides suitable habitat for elk during the spring, summer, and fall.

Elk populations on the Santa Fe National Forest are stable but have decreased since the mid 1990's because of extended hunt seasons and increased elk cow licenses issued. The NMDGF manages elk populations through hunting. Hunt Unit 5B covers the area. Elk on the Santa Fe NF would be ranked as common (1,000-10,000) based on the location and quality of habitat available.

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

Elk in the area are stable in number. The area is within Game Management Unit 5B. Thinning, slash removal and burning would be beneficial to elk habitat as it would allow more forage to grow in the thinned areas and area cleared of slash.

This project would have positive impacts and improve habitat for elk by allowing distribution in areas not grazed presently due to lack of forage especially in areas with heavy slash concentrations. Implementation of this project is not likely to measurably influence the status or trend of this species.

Table 21 Elk Habitat and Percent Affected

Vegetation Type	Total Acres on Forest	Acres within Project Area	Percent of Habitat Affected
Aspen	47,736	2	0
Mixed Conifer (White fir, Douglas-fir, Blue Spruce)	434,657	8687	2
Grass, Oak, Sagebrush	118,171	6040	5
Piñon/Juniper	382,031	7576	2
Ponderosa Pine	362,227	28745	8
Total Acres	1,302,814	51050	17

Direct, Indirect and Cumulative Effects to Management Indicator Species

Direct and indirect effects of the proposed action are increased forage and potential creation of standing dead trees. Some temporary disturbance is expected from activities to implement planned ignitions. An overall increase in available forage is expected which is beneficial. Vegetation holds the soil to reduce sedimentation. It provides forage, seeds and surfaces for insects which are food for many birds. It shades and cools water in streams and holds stream banks intact. Greater vigor in vegetation should also allow for an increase in seeds as food sources available for birds and small mammals. No other effects are known or expected.

MIGRATORY BIRDS

Methodology

The Forest Service, Southwestern Region, currently analyzes effects (impacts) in the following manner:

- effects to Highest Priority listed by *Partners in Flight* (PIF)
- effects to Important Bird Areas (IBAs)
- effects to important overwintering areas

Migratory birds and their habitats are protected under the federal Migratory Bird Treaty Act of 1918.

New Mexico PIF considers eight risk factors in identifying conservation priority species: Global Abundance, NM Breeding Abundance, and Global Breeding Distribution, Threats to Breeding in NM, Importance of NM to Breeding, Global Winter Distribution, and Threats on Wintering Grounds. Species with the highest risk factors are classified as “highest priority” for conservation action. This evaluation addresses general effects to migratory birds.

No FS Regional or Forest policies have been developed to provide guidance on how to incorporate migratory birds into NEPA analysis. Advice from the Regional Office is to analyze effects in the following manner: (1) effects to Highest Priority listed by PIF; (2) effects to Important Bird Areas (IBA); (3) effects to important overwintering areas. This report provides information about effects to migratory bird from the proposed actions in the Cerro Pedernal Allotments Environmental Analysis.

Affected Environment

New Mexico PIF lists priority species of concern by vegetation type. All species of Highest Priority for vegetation types found in this project area were assessed. Table 1 displays the species that occur in the project area.

Alternative A- No Action

Please refer to the beginning of this section; **WILDLIFE (Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds)**, page 39-40 for effects of the No Action Alternative.

Alternative B-Proposed Action

The table below lists species evaluated in this analysis and the potential effects of implementing the Alternative B-Proposed Action.

No permanent or long terms negative impacts are expected occur to Migratory Birds because the actions would be neutral or beneficial due to improved habitat conditions over the long term and

restore ecological integrity to the vegetation types by allowing fire to resume its ecological role in the environment.

Ferruginous hawk, Gray vireo or Gray flycatcher in the piñon-juniper habitat was not considered in this analysis because they are not found in the project area. Also, the Bendire’s thrasher in the piñon-juniper and the Greater pewee in the ponderosa pine were not considered because they are not found on the Santa Fe National Forest.

Table 22 Summary of Effects-Migratory Birds

Vegetation type	Species	Habitat	Habitat Impacts	Disturbance Effects
Piñon-juniper	Black-throated gray warbler	Piñon juniper, mostly in piñon for nesting. Gleans insects from foliage.	No change to tree habitat.	No impact as burns will be done outside of breeding season. Very few acres of PJ mixed in PP.
Ponderosa pine	Northern goshawk	Large trees with open understory.	Timber habitat is not changed. Burning will have a neutral or slightly beneficial effect due to increased forage for prey species.	No impacts are expected to goshawk because burns will be outside of breeding season.
	Mexican spotted owl	Large area of old growth forest and steep vertical canyons.	Not present. See TES write-up. Fire will improve foraging habitat.	None. No nesting habitat or Critical Habitat in area. (Recovery Plan 1995 and Designation of Critical habitat Federal Register 2004). Mainly active at night.
	Flammulated owl	Snags in or near open areas.	Snags will not be affected. Mature trees will be retained.	No disturbance if fire activities occur in late summer/fall.
	Virginia’s warbler	Nests on ground in a variety of understory species and high litter cover. Gambel oak shrub preferred.	Large Gambel oak will be protected from burns.	No impact as burns will be done outside of breeding season.
	Grace’s warbler	Gleans insects from the needles on large trees. Prefers open forest.	Large trees will not be affected. Forest will be kept open.	No impact as burns will be done outside of breeding season.
Mixed conifer, ponderosa pine, ponderosa pine/Gambel oak.	Northern goshawk	Large trees with open understory.	Timber habitat is not changed. Waters and structures will have a neutral or slightly beneficial effect. Prey species could become more easily caught at water.	No disturbance impacts are as burns will be done outside of breeding.

There is no designated Important Bird Area (IBA) affected by the project. IBA on or adjacent to the Santa Fe National Forest are the Chama River Gorge/Golondrino Mesa (SFNF and BLM), the Caja del Rio (BLM), Randall Davey Center (National Audubon Society), and Santa Fe Canyon Preserve (The Nature Conservancy) and Santa Fe River (Bureau of Reclamation) located more than 20 miles from the project. A proposed IBA is Pecos Canyon (SFNF). There is no association or important link between the bird communities within the Chama Rx Burn and these IBA. Therefore, no IBA is affected by the project.

Many important over wintering areas are large wetlands. Important overwintering areas recognized on the Forest include: the Rio Chama and Rio Grande corridor. The project area is

not recognized as an important overwintering area because significant concentrations of birds do not occur here nor does a unique or a high diversity of birds winter here.

Direct and Indirect Effects

Effects are temporary to species and no other activities are ongoing or anticipated that would cause additional effect. There are no cumulative effects to any of the migratory bird species.

CUMULATIVE EFFECTS TO WILDLIFE

Management Indicator Species, Threatened, Endangered and Sensitive Species, and Migratory Birds

Methodology

The geographic area considered for cumulative effects (CEA) on wildlife for the Rio Chama Planned Ignitions and Wildlife Management Project is the national forest lands north and south of Highway 96, which includes part of the Cuba Ranger District (RD) and the ongoing Gallina WUI (Wildland Urban Interface) project on Coyote RD. This cumulative effects area was selected because it represents the extent in which similar activities as those proposed would result in modification of wildlife habitat, and direct or indirect effects to wildlife would occur.

The CEA contains NFS lands and private, state, and other federal ownership. The effects of past, present and foreseeable actions are for the past ten years and those likely to occur in the next ten years. This timeframe would allow wildlife populations enough time to show change or remain constant with the proposed activities.

This cumulative effects analysis considers the landscape encompassed within the project area, the Coyote Ranger District as a whole, the Rio Chama Canyon corridor, the Golondrino Mesa and northern portions of the Cuba Ranger District, and Mesa de las Veijas on the Carson National Forest to the east. Projects under consideration include: (1) those that have been implemented in the last five years; (2) those in the planning stages and (3) those planned in the foreseeable future which reduce the potential for catastrophic wildfire through mechanical thinning, planned ignitions (prescribed fire), or wildfires with multiple objectives.

Alternative A-No Action

Selection of Alternative A (No Action) would not implement planned or unplanned ignitions, and wildfires with multiple objectives in the project area at this time; therefore, there would be no additional or cumulative effects to be considered along with all other projects being implemented in the immediate geographical area or watershed. Please see Table 12 page 37 for a list of projects considered in cumulative effects analysis in this document.

The cumulative effects of not implementing the proposed planned ignitions and related mechanical treatments would result in the continued build-up of ladder fuels and trees densities as natural succession proceeds in the absence of fire within the project area.

Wildfires with multiple objectives initiated by lightning could occur within the project area under the right conditions. The condition under which we would allow for a wildfires with multiple objectives would be similar to those that would be required under the proposed action, and the effects would be similar to those described in Alternative B.

Alternative B-Proposed Action

Cumulatively, implementation of this and many other vegetation treatments planned or currently being implemented on the Coyote and Cuba Ranger Districts would provide forage, browse and habitat conditions over a landscape of broad scale. These improved habitat conditions in a Big Game emphasis area (NMDGF) and in wildlife management areas (Santa Fe National Forest Plan) would provide long-term improvement in habitat conditions.

Project involving forest health mechanical thinning and prescribe fire being implemented on this and adjacent administrative units would result in reduce potential for catastrophic wildfire and improved forest conditions. Forested conditions in Fire Regime Condition Classes 3 and 2 that are improved to Classes 2 and 1 through implementation of the above mentioned project would reduce fuel ladders and the potential of catastrophic crown fires. These improved forest conditions facilitate greater use of wildfires with multiple objectives and ultimately resource restoration and greater biodiversity.

Federal actions that have affects on wildlife habitat include: permitted livestock grazing, wildfire and suppression actions, prescribed fire, timber harvesting, and road activities or actions. Changes in these federal actions may cause temporary disturbance which affects wildlife activity. These actions may have a cause and effect relationship with the direct and indirect effects of thinning, planned ignitions and natural ignitions.

Past actions have contributed to increases in available forage with reductions in large trees and snags on the landscape. However, many projects have been relatively small (<100 ac) and spread across numerous years. Older larger areas (prior to ten years ago) that provided transient forage are converting to forest which reduces available forage. Areas not affected by changes in forest vegetation limit forage availability within the larger area but provide cover and accumulated fuels. Past and present federal actions along with the livestock, elk, deer, and other herbivores (rabbits, insects) use in the analysis area have resulted in the existing conditions of forage availability for wildlife.

Reasonable foreseeable actions such as road closures/obliterations and timber/fuelwood harvest (thinning) could occur within and adjacent to the analysis area and have the potential to maintain or improve habitat within the next 10 years. Recreation activities (hunting, hiking, birding, geocaching, bicycling, piñon picking, camping, fishing, and motorized travel) would continue and create temporary and/or seasonal disturbances.

The cumulative effect of past, present and foreseeable actions in the analysis area with planned and unplanned ignitions would be an additional temporary disturbance, but it would maintain or improve habitat, not change forest cover and preserve water availability in the Rio Chama project area.

Combined with the effects of similar projects on adjacent administrative units; there would be improved forest conditions and a reduction in the potential for catastrophic fire over a relatively large scale landscapes.

AIR QUALITY

Affected Environment

General Meteorology and Climatology

There are no permanent weather observation stations within the project area. Elevations within the project area range generally from about 8000 – 9000 feet above sea level. The National Weather Service Cooperative Observer network (Coop) site at Abiquiu Dam is the closest weather station with current information. However at 6400 ft elevation, temperatures at the observation site are likely 5 to 10 degrees warmer than the project area. Thirty year monthly averages from 1971-2000 for Abiquiu Dam is shown in Table 1. Data were obtained from the Western Regional Climate Center website (WRCC, 2006).

Table 23 Monthly Average Temperature and Precipitation near Rio Chama Project

1971-2000 Monthly Climate Summary													
Abiquiu Dam													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	41.7	47.6	55.1	62.6	72.3	82.7	86.6	84.0	77.4	66.5	51.3	43.2	64.4
Average Min. Temperature (F)	16.7	22.0	28.4	34.8	43.6	52.4	57.5	56.3	49.0	37.8	26.1	18.3	37.0
Average Total Precipitation (in.)	0.35	0.28	0.55	0.65	0.93	0.81	1.63	1.87	1.19	0.88	0.56	0.33	10.04

Average wind and ventilation conditions are available from the Ventilation Climate Information System (VCIS) (Ferguson et.al, 2003). Please see the complete Air Quality Report in the analysis file for details on wind conditions. In general, the 30 year averages of modeled wind conditions for a location within the project area for 5am and 5pm MST. Prevailing winds are generally from the northwest or southeast in the morning and appear to be strongly influenced by the orientation of the Rio Chama Canyon. Afternoon winds are generally within the South to West quadrant though stronger northwest winds are frequently observed in the winter months.

Average ventilation conditions are also available from VCIS. In general ventilation would be worse during winter months when local temperature inversions may cause cold air to be trapped in valleys for extended periods. Burning for this project is expected to be done in the fall or spring with the exception of piled material which would be burned in winter. In general ventilation conditions are better in the spring but this is due to strong winds which may not be suitable for safe burning. Ventilation conditions from September to November gradually drop off as colder weather develops. However, VCIS indicates that even in November ventilation categories of fair or better occurred on at least half the days in the 30 years studied. Thus there should be sufficient opportunities to burn under good ventilation conditions during any of the fall months.

Background air quality data

An air quality monitoring site for San Pedro Parks Wilderness was established in August of 2000 under the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. This site is located about 15 miles southwest of the project area and can be considered representative of the entire area. Extensive data analysis from this site is beyond the scope of this document. The length of record at this station is still too short to draw definitive conclusions about air

quality trends. However, tools for viewing the data in relation to other monitoring sites can be found at <http://vista.cira.colostate.edu/views/Web/IMPROVE/SummaryData.aspx>.

Figure 1 shows a map of light extinction (visibility) measurements averaged over the 20% worst days for all stations in the country in 2004. A low value of light extinction equates with good visibility. It can be seen that even on its worst days this area has better visibility than much of the country.

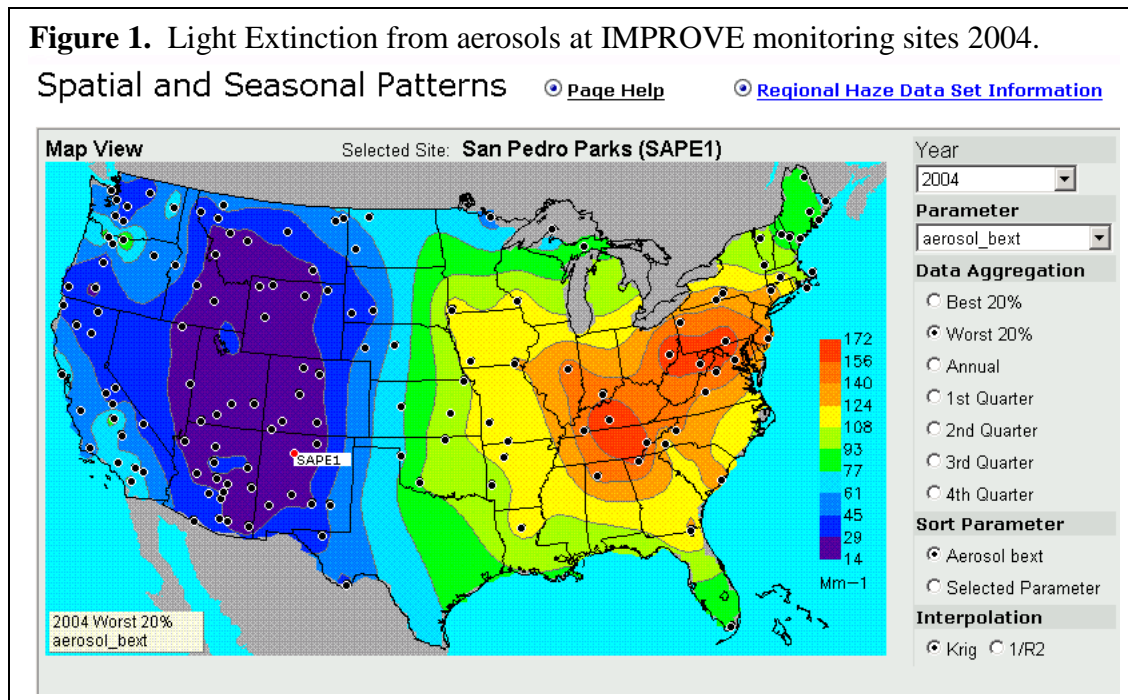
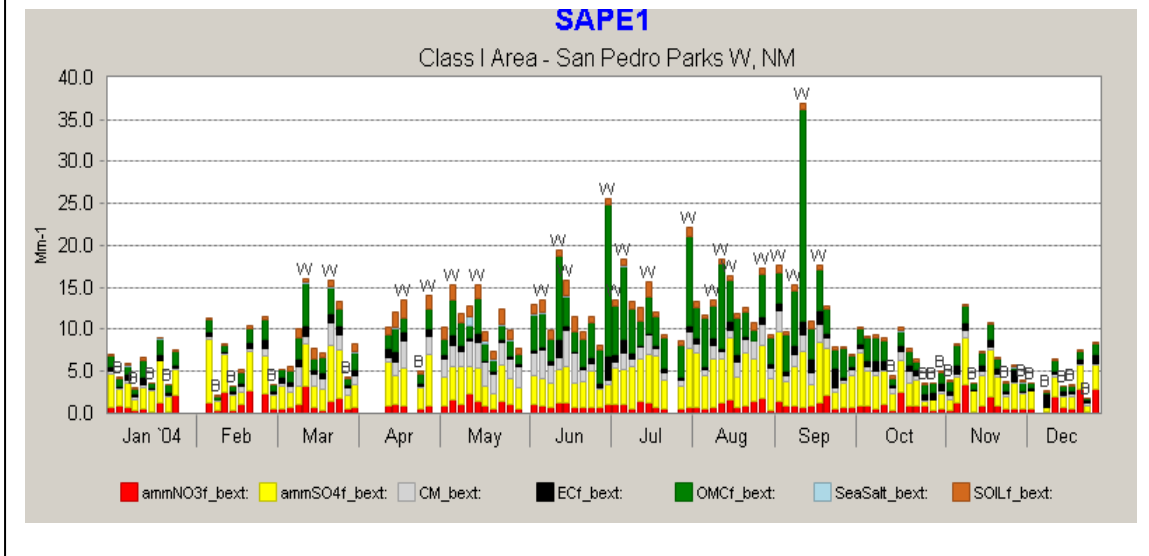


Figure 2 shows the composition of pollutants contributing to visibility degradation. On the best days the greatest contributor to visibility degradation is ammonium sulfate (shown in yellow), attributable to Four Corners area power plants. On the worst days, however, the greatest contributor is organic carbon (shown in green) which can be attributed to smoke from wildland fire.

Figure 2. Composition of pollutants contributing to visibility degradation at San Pedro Parks Class 1 Wilderness.



Applicable Air Quality Standards and Regulations

The Clean Air Act and its amendments require EPA to identify and publish a list of common pollutants that could endanger public health or welfare and to establish criteria for emissions in order to protect the public health and welfare. Of the six “criteria” pollutants which have been identified, PM_{2.5}, particulate matter with diameters less than 2.5 micrometers (um) is of greatest concern to wildland burning. Most (80-90%) of the mass of wildfire smoke falls into the PM_{2.5} classification (Hardy et. al, 2001). The current National Ambient Air Quality Standard NAAQS for PM_{2.5} is 35 micrograms/ cubic meter (ug/m³) averaged over a 24 hours period.

The 1977 amendment to the Clean Air Act established a national goal of “prevention of any future and remedying of any existing impairment of visibility in mandatory Class I federal areas which impairment results from manmade pollution.” The San Pedro Parks Wilderness area is a mandatory Class I area. Under current regulations smoke from planned ignitions is considered manmade pollution while smoke from wildfire is not. These regulations are due to be revised soon and may exempt some planned ignitions from consideration as pollution. The new regulations would also clarify how smoke from wildfires with multiple objectives is to be classified.

EPA has delegated to the states the responsibility to implement and enforce all laws and regulations ensuing from the Clean Air Act. The State of New Mexico Environment Department, Air Quality Bureau (NMED AQB) has developed a Smoke Management Program (SMP) in order to regulate and monitor burning in the state. Federal burners are required to follow the requirements of the SMP.

DIRECT AND INDIRECT EFFECTS TO AIR QUALITY

Alternative A No Action

Implementation of the No Action alternative would not produce any effects to air quality through planned ignitions activities within this project area. No effects to regional haze or particulate

matter or effects to Class I (San Pedro Parks Wilderness) or to Class II Viewsheds (Rio Chama Corridor Wilderness) would occur.

Unplanned ignitions initiated by lightning strikes that are allowed to burn with multiple objectives could occur and would contribute to a temporary reduction in air quality. The effect would be similar in duration and magnitude as described for Alternative B (Proposed Action) in this section.

Direct and Indirect Effects of No Action/Wildfire

A wildfire burning through this area would produce significant smoke impacts. PM_{2.5} concentrations would be well in excess of the NAAQS for at least 50 miles away from the fire. Total emissions would be greater than if burned under controlled conditions and would be concentrated in a short time frame thus having a significant impact on the health of area residents. In addition, a wildfire may not be restricted to the area of this project so smoke from the burning of surrounding areas would make emissions even higher.

Because a wildfire would likely occur under hotter and drier conditions than a planned ignition, burning would be more intense and more fuel would be consumed within the target area. This would mean more smoke and the hotter fire would cause the smoke to be lifted higher into the atmosphere where winds are stronger. Thus smoke would be transported longer distances and impact a much larger area than if burning is done under controlled conditions.

Indirect impacts on air quality from suppressing a large wildfire would mainly be caused by exhaust from fire fighting vehicles.

Alternative B Proposed Action

The following is an analysis of the possible effects of implement Alternative B Proposed Action.

Air Quality Sensitive Sites in the vicinity

- Gallinas, Coyote, and Abiquiu residential communities
 - Impacts would be greatest at night and into the early morning hours as smoke settles and is carried off the mesa top down drainages and into the Chama River Canyon/Valley.
- San Pedro Parks Class 1 Wilderness
 - The wilderness boundary is located less than 10 miles southwest of the project area. However, due to the orientation of the topography which would channel drainage flow overnight and the prevailing winds from the south and west it is unlikely that the Class1 Wilderness would be significantly impacted
- Chama River Canyon Class 2 Wilderness
 - Some burning into the Wilderness is expected and smoke from this project would drain into the Chama River Canyon overnight. This may result in impacts to recreational values in the Canyon at certain times of the year.
- State Highway 96 and US Highway 84
 - Smoke draining off the mesa could result in visibility impairment along State Highway 96 from approximately Gallina to the intersection of US Hwy 84. Hwy 84 could be impacted from approximately Echo Amphitheater to Abiquiu. Impacts are mostly likely at night and in the early morning hours.
- Forest Roads 8, 9, 11, 64, 77, 468, 524, and 233

- Some smoke can be expected along each of these roads. Local degrees of visibility restriction would depend on wind direction and ventilation conditions.
- Abiquiu Reservoir
 - Smoke would likely drain into the Abiquiu reservoir potentially impacting recreational values.
- Ghost Ranch
 - Scenic values at the Ghost Ranch retreat center would likely be impacted for short periods.

The Smoke Impact Spreadsheet which incorporates the First Order Fire Effects Model (FOFEM) and some components of CalPuff was used to estimate emissions from a wildfire in this area compared to planned ignitions. Both scenarios used the same fuel model and fuel loading approximations. The wildfire assumed a windy summer day under dry conditions and 20% crown fire. The planned ignition assumed a typical fall day with moderate moisture conditions.

Under the wildfire scenario burning continued for four days with NAAQS for PM2.5 exceeded up to 50 miles from the fire. Under the planned ignitions scenario there was no NAAQS standards exceeded. Table 23 shows emissions for a number of pollutants in lbs/acre for each scenario. In all cases the emissions per acre are less for the planned ignition scenario.

Table 24 Emission Estimates

Emissions	Wildfire	Planned Ignitions
	lb/acre	lb/acre
PM10	362	327
PM2.5	307	277
CH₄	179	163
CO	3837	3504
CO₂	31285	25413
NO_x	29	20
SO₂	22	17

Emissions from planned ignitions are regulated by NMED AQB. Daily limits on acres burned, and thus emissions are set by the Smoke Management Program in order to ensure compliance with National Ambient Air Quality Standards (NAAQS). The emissions shown in Table 2 indicate that per acre emissions from planned ignitions would be less than for a wildfire. PM2.5 concentrations would be well within the NAAQS even near the burn.

In the event a wildfire is managed for multiple objectives, the per acre emissions would likely fall somewhere between the emissions shown in Table 24 for wildfire and for planned ignitions because temperatures and fuel moistures would fall between those modeled and crown fire would be less than for the extreme wildfire event modeled. The potential for smoke impacts would be incorporated in the decision process for managing a fire for multiple objectives and actions would be taken to minimize emissions.

CUMULATIVE EFFECTS TO AIR QUALITY

Alternative A-No Action

There would be no effects to air quality by not implementing planned ignitions at this time; therefore, there would be no cumulative effect to other planned or unplanned ignitions that are likely to be initiated in the area of consideration. Please see Table 12 page 37 for a list of projects considered in cumulative effects analysis in this document. Unplanned ignitions could occur within the proposed project area under appropriate conditions and would likely effect air quality as described earlier in this section.

The risk of wildfire and the potential affects to air quality would not be reduced by not implementing planned and unplanned ignitions as proposed. The result is the continued potential that wildfires are likely to affect the air quality in the future. When compared to the proposed action, this alternative would produce greater affects to air quality in duration and intensity during wildfires.

Alternative B-Proposed Action

This project may contribute to regional haze, which can result from multiple days of burning and/or multiple owners using the airshed over too short a period of time. Such effects would, however, be less than those caused by a wildfire.

RECREATION AND RIO CHAMA CORRIDOR WILDERNESS

WILDERNESS, RECREATION, AND THE CONTINENTAL DIVIDE TRAIL

Affected Environment

The Rio Chama River Corridor Wilderness is approximately 50,300 acres in size is encompassed in both the Santa Fe and Carson National Forests. Approximately 28,242 acres of the wilderness are within the project area. Within the Rio Chama Corridor Wilderness, the Rio Chama Wild and Scenic River and corridor which provides access for visitors, recreationists and private land owners.

This wilderness is known for its steep relief (please see Fig CC), rock outcrop, vertical cliffs and river valley which form spectacular vistas from along FR 151 and elsewhere along the canyon rim. Recreation in the wilderness and corridor consists mainly of camping, river rafting, fishing, equestrian sports and riding, hunting and sightseeing, among others. The Monastery of the Desert at the end of FR 151 is a common destination for many who visit this area.

Developed and designated dispersed camping is common along the corridor from the Big Eddie Takeout to Chavez Canyon Put-In near the Monastery. The Rio Chama Campground offers designated camping and picnicking facilities, group sites and vaulted toilets.

Rafting is provided either via day trips from Chavez Put-In to the Big Eddie Take-out, and overnight trip (permitted by the BLM-Taos Office) from El Vado Reservoir to the Big Eddie Take-out.

The National Scenic Continental Divide Trail (CDT) bisects the project area from the southwest to northeast, rising from New Mexico Highway 96 across Mesa Alta and Mesa del Camino, down into the Wilderness in Ojitos Canyon, crossing the Rio Chama at Skull Bridge then rising up the San Joaquin segment on to the Mesa de las Viejas on the Carson National Forest. This CDT segment is known as a challenging trail with remote and beautiful vistas.

DIRECT AND INDIRECT EFFECTS TO RECREATION AND RIO CHAMA CORRIDOR WILDERNESS

The following analysis will address the possible effects to the Rio Chama Corridor Wilderness, the Rio Chama Wild and Scenic Corridor and the National Scenic Continental Divide Trail.

Alternative A-No Action

There would be no effects to the Rio Chama Corridor Wilderness, the Rio Chama Wild and Scenic River designation, recreational activities or resources along the Continental Divide Trail (CDT) by not implementing planned and unplanned ignitions at this time. The vistas, scenic viewsheds and recreational opportunities would not be altered. Common recreation activities would continue. When compared with Alternative B implementing this Alternative would produce less effect to wilderness resources in the short-term. However, without reducing the potential of catastrophic wildfire in the wilderness and the surrounding landscape, there is a relatively high potential of catastrophic wildfire that would adversely affect these wilderness values. Please see page 22-24 for fire regime and the potential of return fire, approximately 22 years.

Unplanned ignitions are likely to occur within the Wilderness and on adjacent landscapes outside the Wilderness. These fires would be allowed to burn with low and moderate severity; resulting in little change in the appearance of the overstory of forested stands burned. The effects would be subtle changes in color and texture in those few areas within the Wilderness and adjacent landscape that are allowed to burn. Given the restricted conditions under which unplanned ignitions are allowed to burn (cool low and moderate severity), and the limited areas that unplanned ignitions are capable of burning. There would be little or no affect. Viewsheds within the wilderness are largely restricted to FR151 which provides views of the eastern edge of the project area and those from the Carson National Forest along the edge of Mesa de las Viejas. Please see photo below illustrating the views and sparsely vegetated canyon sideslopes.

Photo 1



Photo 2



Note in Photos 1 and 2, in the foreground and lower elevations in the background; changes in texture and color can be viewed where sagebrush mowing (Photo 2) and historic agricultural fields exist (Photo 1). Also note the rather sparse vegetation on the canyon walls on the lower third of the slopes. These forest/fuel conditions are not conducive to carrying an unplanned ignition or that of a planned ignition that migrates from the top of the mesa or canyon wall. Any changes in color and texture would be minimal, largely unnoticeable along FR151 along the bottom of the canyon, and short lived in nature (<3 years). Any observable change in color or

texture would be less noticeable than mowed sagebrush fields of the agricultural fields at Skull Bride. Changes in texture is color due to planned and unplanned ignitions would closely match that of the existing patchiness and appearance along the Rio Chama Canyon walls as seen in the above photographs.

The same can be said for potential affects to the scenic resources along the Continental Divide Trail. Photos illustrated in Figure Y is a view from a scenic spur from the CDT on the Carson National Forest looking west into the project area, and Figure X is taken from the CDT along the San Joaquin Segment looking west into the project area into Ojitos Canyon.

Due to the limited opportunity to allow unplanned ignitions to burn with multiple objectives, the Wilderness would remain susceptible to catastrophic wildfire. The effects of a wildfire burning within the Wilderness would affect the scenic viewshed in both color and texture due to uncontrolled wildfires that would produce greater impacts through crown fire mortality on the viewshed than planned ignitions or unplanned ignitions.

Without the introduction of planned ignitions and given the limited opportunity for wildfire with multiple objectives, the Wilderness will not be moved toward the desired presettlement forest structure and composition. Presettlement Wilderness landscapes would allow for patchy non-catastrophic, less than landscape scale fires to occur and naturally extinguish themselves.

Despite allowing unplanned ignitions to burn within the Wilderness, it would still remain susceptible to catastrophic crown fires. Crown fires would severely affect the scenic quality of the Rio Chama Corridor Wilderness, the Rio Chama Wild and Scenic Corridor and that of the CDT and other recreational opportunities across the landscape. Changes in color, texture and contrast would remain for decades. Affects in terms of higher than normal runoff, erosion along the CDT and elsewhere would affect the water quality of the Rio Chama; thus affecting fishing, rafting and boating, hunting and the general recreational experience for decades.

Alternative B-Proposed Action

Modeling fire behavior with the BEHAVE fire spread model shows a backing fire burning under prescribe fire conditions with flame lengths less than a foot and a rate of spread of 30 feet/hour. This type of fire would reduce surface fuels but would not kill trees. The reduction of surface fuels would decrease the intensity of potential wildfires burning out of the Wilderness. A planned ignitions management objective for the wilderness, as stated in Forest Service Manual 2300, would be met of reducing the risks and consequences of wildfire within wilderness or escaping from wilderness.

Implementation of Alternative B would produce similar effects to wilderness and recreational resources through the use of low and moderate severity fires (unplanned and planned) as described in Alternative A; however, to a larger extent. Planned and unplanned ignitions, wildfire with multiple objectives, would produce minimal affects to the texture, color, and contrast within the wilderness and along the wild and scenic corridor. Changes along the CDT would be as described in Alternative A without the affects of catastrophic wildfire. The same potential and restriction to unplanned ignitions exist as presented in Alternative A; however, with the potential to allow planned ignitions to migrate into the wilderness; there would be slight increase in the size of area exposed to planned ignitions. This would produce a slightly greater spatial extent of visual changes in the wilderness in the form of color and texture. Views along the CDT would likely be altered. The evidence of planned and unplanned ignitions would persist

on the landscape for 2-5 years following the events, in contrast to the decades of impact that a catastrophic crown fire would have.

The Rio Chama Wild and Scenic River corridor exists immediately east and adjacent to the project area. There would be no effect to the river's attributes for which the wild and scenic designation was given.

CUMULATIVE EFFECTS TO RECREATION AND WILDERNESS

Alternative A-No Action

Implementation of Alternative A would not contribute to cumulative changes in the wilderness values of the Rio Chama Corridor Wilderness when considering other past, present and foreseeable projects. Please see Table 12 page 37 for a list of projects considered in cumulative effects analysis in this document.

In addition to the projects listed on the page listed above, sagebrush mowing within the Wild and Scenic Rio Chama River Corridor has occurred within the last 10 years. The mowed areas have a distinct edge, and change in appearance and texture. These mowed fields are visible from FR151 and effects persist to this day, and are seen in Photo 1 on page 56.

Planned ignitions and forest thinning has been occurring along the CDT from where it climbs up to Mesa Alta north of NM Highway 96, across Mesa del Camino to the top of Ojitos Canyon. These activities are being implemented via earlier decisions and have resulted in minor changes in color and appearance and the CDT cross FR77 and through Mesa del Camino. These affects would be typical of the short-term changes that would occur via implementation of Alternative B. That is minor mortality in the overstory, and an increase in mortality in the smaller diameter trees, and the appearance of red needles in the lower branches of trees exposed to low and moderate fire severity. These changes in color and contrast last between 2-5 years.

As the projects listed above are implemented the effect would be to reduce the potential of catastrophic wildfire across the landscape and adjacent landscape; thus reducing the potential of wildfire within the wilderness. This however, reduces the potential for catastrophic wildfire along with the associated affects without allowing planned ignitions to migrate into the Wilderness, nor promoting unplanned ignitions to burn under appropriate conditions.

Alternative B-Proposed Action

Implementation of Alternative B would produce similar effects as described above, and in combination with all other projects lists that contribute cumulatively to this project, there would be a net improvement in forest conditions via a reduction in the potential for catastrophic wildfire across the landscape. This alternative would allow for fire to assume its natural role in the landscape including the Wilderness. When compared to Alternative A, this alternative would produce similar immediate affects, but long-term improvement in the function of fire in the wilderness, and the protection of wilderness values and viewshed.

The change in color, texture and appearance of mowed sagebrush fields would persist in the foreground. Possible changes in the viewshed in the form of color, texture and appearance through planned and unplanned ignitions is unlikely to contribute cumulatively due to the possible changes occurring in the background and the subtle nature of that change. Planned

ignitions initiated in the last three years are visible from FR 151; however, changes in the visual appearance should be difficult to observe.

SOILS AND WATERSHED
WATERSHED CONDITION AND WATER QUALITY

Affected Environment

The Rio Chama Wildlife Management Planned ignitions Project is located within portions of three Hydrologic Unit Code 5th level watersheds; Canjilon Creek – Rio Chama, Rio Gallina, and Rio Puerco (Table 1). The Rio Chama flows along the eastern boundary of the project area and is buffered by the Rio Chama Wild and Scenic management area. The Rio Gallina flows north, west of the project area, as it flows east it enters the project area for approximately two miles leaving the project area as it enters the Rio Chama Wild and Scenic management area. The upper Rio Puerco watershed, which is drained by Salitral Creek sub-watershed, is within the southern portion of the project area. Tables 2 and 3 illustrate the HUC 5th code watershed acres the project area is contained within, by planned ignitions and treatment areas with wildfire for multiple objectives.

Table 25 Treatment Type by HUC 5th Field Watersheds

Watershed Name	Watershed Total Acres	Project Acres Within Watershed	Project Acres Percent of Watershed	Planned Ignition Acres	Unplanned Ignition Acres
Canjilon Creek-Rio Chama	271,163 acres	40,596 acres	15%	20,540 acres	20,055 acres
Rio Gallina	179,605 acres	39,058 acres	22%	28,490 acres	10,589 acres
Rio Puerco	130,606 acres	13,188 acres	10%	2,573 acres	10,615 acres
TOTAL	581,373 acres	92,841 acres	n/a	51,603 acres	41,259 acres

The surface hydrology and drainage patterns of the contributing watersheds within the project area have a dendritic drainage pattern in the headwaters and low elevation areas, with headwater areas transitioning to deeply incised parallel south to north trending drainage patterns (narrow canyons) as it dissects through numerous mesa landforms. Average annual precipitation ranges from 12 inches in lower elevations to 24 inches in higher elevations. Precipitation falls as snow during the winter months, as large-scale frontal storms with low-intensity rainfall during spring and fall, and as localized high-intensity thunderstorms from June through September. Precipitation in the form of snowfall dominates the annual precipitation throughout the project area with the exception of low elevation areas along the Rio Gallina, Rio Chama and Mesa Alta fault scarp (TES, Santa Fe National Forest, 1993). Numerous intermittent streams and arroyos run throughout the project area including a small perennial reach of Ojitos Canyon Creek (Table 4). In intermittent stream channels, rainfall generated flows are of relatively short duration and high intensity during the monsoon season, with extended low flows from long duration storms during the fall and spring runoff period.

Table 26 Stream Type and Length

Stream Class	Length in Project Area	Lengths in Unplanned Ignition Areas	Lengths in Planned Ignition Areas
Perennial	0.68 miles	0.68 miles	0 miles
Intermittent	559 miles	277 miles	282 miles

The New Mexico Environmental has assessed water quality of perennial streams within the project area. According to the 2006 NMED SWQB report “Status of Water Quality in New Mexico: The Integrated 305(b) Assessment and 303(d) Listings Report” (NMED, 2006), there is one impaired surface waters (streams, lakes, etc) within the project area. The Rio Puerco is listed as impaired and is outside of the project boundary although a portion of the upper headwater area of the Rio Puerco, Salitral Creek sub-drainage, is within a portion of the project area. The Rio Puerco is not in attainment due to the designated use – high quality aquatic life – is not supporting with sedimentation/siltation as a probable cause of impairment and probable sources of impairment being; loss of riparian habitat, natural sources, silvicultural harvesting, and streambank modification/destabilization.

SOIL CONDITION AND PRODUCTIVITY

Affected Environment

Data from the Terrestrial Ecosystem Survey (TES) GIS layer was used extensively and individual map units served as the template for the soils analysis. TES map unit delineations are based on differences in landform, geology, topography, vegetation and resulting soil types (USDA Forest Service, 1993). Soil development within the project area has been greatly influenced by the local geology, climate, vegetation and topography that include mountainous and dissected canyon topography, scarp slopes, mesa tops, elevated plains and valley plains.

The project area is located at the southern most extent of the greater Colorado Plateau physiographic region. Specifically it lies in the transition zone between the older Tusas Mountains to the east, and the younger San Juan Basin to the west. The Rio Chama Canyon and much of the project area is located on the eastern portion of the Gallina Fault Zone, a north and north-west-trending, strongly faulted series of dome-type formations.

Landforms that comprise the project area, based on the TES, include hills-mountains, elevated plains, valley plains, hills and mountain scarp slopes, and scarp slopes (USDA Forest Service, 1993). Table 27 shows the landforms found within the two treatment areas, planned ignitions use and wildland fire-use.

Table 27 Treatment by Landform Type

LANDFORM	PLANNED IGNITIONS USE		UNPLANNED NATURAL FIRE	
	Acres	Percent	Acres	Percent
Hills/Mountains	20,806	40	12,191	30
Elevated Plains	19,022	37	7,732	19
Valley Plains	1,454	3	3,030	7
Hills/Mountain Scarp Slopes	8,030	16	11,326	27
Scarp Slopes	2,292	4	6,949	17

Please note that hill, mountain and scarp slopes (steep terrain) is limited (20%) within the planned

ignition areas of the project while those landforms dominate (54%) in the wilderness where wildfire with multiple objectives would be used. Mountain scarp and scarp slopes have limited or no ability to support vegetation due to the dominance of rock outcrop extremely steep slopes.

There are a total of 42 distinct TES map units within the project area. Within the planned ignitions use area there are 37 TES map units, dominated by four map units that represent 50 percent of the area and ten map units that represent over 75 percent of the area. Within the wildfire use area there are 36 TES map units, dominated by five map units that represent 50 percent of the area and ten map units that represent over 75 percent of the area.

The table below illustrates the forested TEU map units common to the planned ignitions and wilderness portions of the project area. Attention is focused on forested ecosystems because of the intent to manage them over grassland ecosystems.

Table 28 Forested TEU Map Units

TEU Map Unit	Slope Percent	Vegetation	Acres
101	40-120%	Piñon/Juniper	
128	40-120%	Juniper	
139	40-120%	Mixed Conifer	
142	15-40%	Mixed Conifer	
149	40-120%	Ponderosa pine	
151	0-15%	Ponderosa pine	
155	0-15%	Ponderosa pine	
161	15-40%	Mixed Conifer	
162	15-40%	Mixed Conifer	
165	0-15%	Mixed Conifer	
398	15-40%	Mixed Conifer	

Soils derived from the dominant sandstone parent materials are classified at the Soil Order level as Alfisols, and to a lesser extent Inceptisols, Mollisols and Entisols (Table 7). Alfisols are moderately leached forest soils that have relatively high native fertility. These soils are well developed and contain a subsurface horizon in which clays have accumulated. They are more developed than Inceptisols, which are soils that exhibit minimal horizon development and are more developed than Entisols, but still lack the features that are characteristic of other soil orders. Entisols are often found on fairly steep slopes, on resistant parent materials and are soils of recent origin. The central concept is soils developed in unconsolidated parent material with usually no genetic horizons except an A horizon. Mollisols are the soils of grassland ecosystems. They are characterized by a thick, dark surface horizon.

Table 29 Soil Classification by Treatment Area

SOIL ORDER	PLANNED IGNITIONS USE		UNPLANNED NATURAL FIRE	
	Acres	Percent	Acres	Percent
Alfisols	42,232	82	26,642	65
Mollisols	3,580	7	65	<1
Inceptisols	3,192	6	5,903	14
Entisols	47	<1	1,844	4
*Scarpes	2,552	5	6,774	16

***Rocky, steep cliffs having little or no soil.**

Soil Condition

The condition of a soil is an important component of the TES, where each dominant map unit component is assigned a soil condition category, which is an indication of the status of soil function. Soil condition categories reflect soil disturbances resulting from both planned and unplanned events. Current management activities provide opportunities to maintain or improve soil functions that are critical in sustaining soil productivity. In addition to an evaluation of soil quality, soil condition is also considered a general evaluation of watershed condition. Soil condition categories are satisfactory, impaired or unsatisfactory (USDA Forest Service, 1993). Definitions for soil condition ratings from the Forest Service R3 Soil Management Handbook are as follows:

- Satisfactory. Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.
- Impaired. Indicators signify a reduction in soil function. The ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. An impaired category indicates there is a need to investigate the ecosystem to determine the cause and degree of decline in soil functions. Changes in land management practices or other preventative measures may be recommended, depending upon the cause or the extent of the problem.
- Unsatisfactory. Indicators signify that a loss of soil function has occurred. Degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs or recover from impacts. Unsatisfactory soils are candidates for improved management practices or restoration designed to recover soil functions.

Soil condition ratings apply to lands where long-term soil productivity and satisfactory watershed condition are the primary objectives. The soil condition rating procedure evaluates soil quality based on an interpretation of factors that affect three primary soil functions. The primary soil functions evaluated are soil stability, soil hydrology and nutrient cycling. These functions are interrelated (FSH R3 SUPPLEMENT 2509.18, pg 4, 2002).

Soils within the project boundary are predominantly in satisfactory condition within the planned ignitions area (80%) and to a lesser extent in the wildfire use area (39%), within bed preparation units soil condition is Satisfactory, based on the TES soil survey and knowledge of the area. An impaired or unsatisfactory soil condition can be based on geologic conditions, such as steep slopes that naturally result in poor soil formation and erosional conditions. Areas having an unsuited soil condition are typically steep scarp slopes areas, while unsatisfactory soil condition are typically hills and mountains scarp slopes.

Table 30 Soil Condition by Treatment Area

Condition	Planned Ignitions		Unplanned Natural Fire		Bed Preparation Units	
	Acres	Percent	Acres	Percent	Acres	Percent
Satisfactory	41,313	80	16,157	39	4,622	>99
Unsatisfactory	7,659	15	13,420	33	33	<1
Unsuited	2,632	5	11,652	28	000	0

* The area having unsatisfactory soil condition is the Mesa Gurule Electronic Site. This area will be hand thinned, piled, and burned.

Areas with soils in unsatisfactory condition on Mesa Gurule Electronic Site would be hand thinned, piled and burned to mitigation promote recovery while minimizing the effects of planned ignitions or use of heavy equipment.

Production and Revegetation Potentials

Production potentials are based on estimates and measurements taken from the TES survey. Coefficients correlate primarily to soil/vegetation/climate and a general slope restriction. Usually climate is the most restricting parameter in this evaluation process. The desert (hot, dry) and the mixed conifer forest (cool, moist) represent the climatic extremes within the Santa Fe National Forest. The climate between these extremes offers varying temperature and moisture conditions for plant production and is reflected in the assigned coefficients. Production potentials would change at the upper and lower climatic limits and with differences in slope, aspect and soils. Revegetation potential refers to the probable success and ease in the establishment of native graminoids. This rating is influenced by climate, soil characteristics and slope. The initial stratification by soil climate yields limitations that usually are not economical to mitigate. A low or moderate rating alerts the land manager to potential limitations for successful revegetation of an area. Soils associated with a high rating offer the best opportunity for success. The udic/frigid combination offers the optimum soil climate for establishment of vegetation. Conversely, the aridic/thermic combination offers the most limiting opportunity for the establishment of vegetation.

Revegetation potential contains ratings for re-establishment of vegetation, both reforestation and natural regeneration potentials for each dominant map unit component. The ratings used are low, moderate or high. Revegetation potential ratings within the planned ignitions use area are predominantly moderate and high with 42,114 and 17,379 acres respectively (72 %). The remaining area within occurs mostly within the unplanned ignitions areas have revegetation potentials that are mostly low (57 %) with 37,973 acres. Within the bed preparation area the revegetation potential ratings are moderate to high (99.7 %).

DIRECT AND INDIRECT EFFECTS TO SOILS AND WATERSHED

Alternative A-No Action

Implementation of Alternative A would not implement planned ignitions at this time; therefore, there would be no affects to soil and watershed resources. Unplanned ignitions are likely to occur within the project area, and under multiple objectives would result in minimal short term (<3 year) effects to soil and watershed conditions.

Fires under these conditions (low and moderate severity fire) would promote a strong herbaceous understory or perennial grasses and forbs. In those areas dominated by soils that developed under grassland conditions have a relatively high potential for revegetation and would respond with increased composition and production of, and an increase in ground cover provided by herbaceous vegetation. Forested soil types would respond to a lesser degree than described for those soils that developed under a grassland influence. Erosion and sedimentation rates would be relatively higher and the vegetative response slower (3-5 years); however, these conditions would not be sufficient to effect the long-term productivity of the site. There would be little or no change in the amount of soils in unsatisfactory conditions. The changes in forest structure and composition, and that of the understory vegetation would more approximate conditions under the normal fire regime for the landscape. Soil nutrient cycling would develop toward that of the

original soil genesis, and the hydrologic characteristics of high infiltration rates and limited runoff would improve.

Sediment stored in intermittent and ephemeral drainages would remain. The improved hydrology and reduce evaporation/transpiration demands due to the reduced tree density would provide improved subsurface hydrology and could (but unlikely) improve the conditions of springs within the watershed. These positive effects would be limited to those few opportunities and areas where unplanned ignitions occur under the correct conditions to be allowed to burn. As mentioned earlier, only 3,305 acres unplanned ignitions have been allowed to burn on this landscape in the last five years. Without the benefit of implementing both planned and unplanned ignitions across the project area, there would be insufficient improvement to the vegetative composition and structure to withstand a wildfire event.

Unlike unplanned ignitions under the right conditions, unplanned ignitions under conditions conducive to wildfire would severely affect soil and watershed conditions. Those conditions would persist for greater than five years, and some cases for decades. Soils subjected to high severity fire could be void of vegetation and effective ground cover for years. Those areas dominated by shrub species would respond quickly (< three years); however, higher than normal sediment production would persist for up to 10-15 years. The project area is dominated by intermittent and ephemeral drainages, which would subject to high fire intensities and the subsequent “flashy” hydrology would initiate sheet and rill erosion, and mobilize stored sediments in drainages. Changes in the hydrologic regime of these watersheds would occur, with higher runoff and peak flows, and vastly increased sediment loads.

When compared to Alternative B (Proposed Action) the potential adverse affects to soils and watershed conditions are much higher if Alternative A (No Action) is implemented. The limited opportunity and the limited extent (acres) of reduced ladder fuels, and changes in forest structure and compositions by relying on unplanned ignitions would be insufficient at reducing the potential effects of wildfire across this landscape.

Alternative B-Proposed Action

Implementation in Alternative B (Proposed Action) would result in the greatest extent of improved forest structure and composition; improve the ability of the forested ecosystem to accept period unplanned ignitions that would result in improved conditions versus the effects of catastrophic wildfire. The potential for catastrophic wildfire would be reduced across the landscape. Forest and grassland ecosystems would return to a more normal soil and hydrologic regime as described in Alternative A with period unplanned ignitions under with multiple objectives (low and moderate fire severity).

Implementation of bed preparation units would cause minor increases in the bulk density of the soils and a corresponding decrease in infiltration capacity. These conditions could increase the amount of runoff on the approximately 4,635 acres of proposed bed preparation units. These conditions; however, would not result in erosion rates that could affect site productivity, and increases in runoff would be negligible and would not influence the hydrologic regime.

Wetlands less than 0.10 acre in size, as characterized by the presence of landform, hydric soil or facultative or obligation wetland vegetation, occurs near perennial and ephemeral springs, and riparian areas along very narrow and short segments of perennial and ephemeral creeks occur within the project area. They are insufficient is size to be

mapped via the Terrestrial Ecosystem Survey (TEU). No wetland areas are proposed for treatment with planned ignitions, and all springs and water developments would also be protected from planned ignitions. Riparian area within the project area are proposed for planned and unplanned ignitions. The effects of which would be beneficial.

CUMULATIVE EFFECTS TO SOILS AND WATERSHED CONDITIONS

Please see Table 12 page 37 for a list of projects considered in cumulative effects analysis in this document.

Alternative A-No Action

Not implementing unplanned and planned ignitions, as those proposed in Alternative B, the ecological conditions of the forests on this landscape and those of the surrounding landscapes would not be moved toward more sustainable conditions. Ongoing projects (see Table 12 on page 37) would improve conditions in those few areas on this landscape, and when combined with the planned Golondrino Landscape Prescribe Fire project. Reducing the susceptibility of these landscapes to the potential effects of catastrophic wildfire reduces the potential adverse affects to soil productivity and the hydrologic regime. And additional project not addressed in the Cumulative Effects Projects Considered Table on page XX, is the Coyote Ranger District Road Closure and Decommissioning Project (September, 2005). The closure and decommissioned of roads across the district would cumulatively improve soil and watershed conditions. There may be short-term increases in bare soils and sediment transport as any of these projects are implemented; however, the overall effects are improvements in watershed conditions and function.

Alternative B-Proposed Action

Implementation of Alternative B along with ongoing projects and those planned in the foreseeable future would produce positive improvements in across the landscape. When combined with an increase in alternative sources of forage for both large ungulates (deer and elk) and livestock, those rangeland resources in poor or fair conditions may improve to fair and good conditions as a result of reduced grazing pressure.

Heritage Resources

DIRECT AND INDIRECT EFFECTS TO HERITAGE RESOURCES

Alternative A-No Action

Implementation of the Alternative A would not affect heritage resources. By not implementing planned ignitions, the heritage resources common to the project area would not be subject to any mechanical treatment or planned ignitions.

The potential for catastrophic wildfire would not be diminished should this alternative be selected; therefore, in the event of a wildfire that is out of control, there is the potential to affect those heritage resources within the project area.

Alternative B-Proposed Action

As it is stated in the Alternative B, there would be *no adverse effect* to historic properties provided recommendations for bed preparation, planned ignitions (prescribed burning) and managing wildfire with multiple objectives (unplanned ignitions) for resource benefits are followed. A variety of activities are proposed within the RIO CHAMA PLANNED IGNITIONS AND WILDLIFE MANAGEMENT PROJECT. The intent of a heritage resources evaluation,

(*SFNF Report #2008-10-006; Rio Chama Prescribed Burn and Fuels Treatment Project-Phase 1 Bremer et al. March 15th, 2009*) is to provide a management strategy and clearance recommendations for those activities that can be conducted given the amount of previous valid survey and the current understanding of the nature of cultural resources in the project area.

Unplanned ignitions across the entire project area would be handled through involvement of the Forest or District Archaeologist in the decision to use fire for multiple objectives using available information to make recommendations, including SHPO notification and protection of documented heritage sites. When practical, given safety requirements, and as feasible, the Forest or District archaeologists would evaluate any new sites for fuel loading and would recommend treatments for fire sensitive sites prior to directing fire into those areas. Therefore there would be no effect to heritage resources.

There are no traditional cultural properties in the project area. Tribal consultation with 26 tribes and pueblos returned one response, who said their traditional cultural properties (TCPs) were outside the project area.

CUMULATIVE EFFECTS TO HERITAGE RESOURCES

Alternative A-No Action

There would be no effects to heritage resources by not implementing planned ignitions and bed preparation at this time; therefore, there would be no cumulative effect by other planned ignitions or unplanned ignitions that are likely in the area of consideration. The potential for catastrophic wildfire would not be diminished should this alternative be selected; therefore, in the event of a wildfire that is out of control, there is the potential to affect those heritage resources, especially fire sensitive resources, located within the project area.

Combined with those project listed on [page 31 and 32](#) for a list of projects considered in cumulative effects analysis in this document, it is unlikely there would be a cumulative adverse effect to heritage resources or traditional cultural places. The effects would be similar to that described above.

Alternative B-Proposed Action

Cumulative effects of implementation of the proposed action would, in some cases, remove vegetation in dense areas thus making the heritage resources, whether scatters of artifacts or structural materials, more visible and likely to suffer vandalism. However, higher visibility would aid in inventory of previously undocumented resources, thus adding to the prehistoric knowledge of the area. Soil loss/ erosion near historic properties during post treatment rains would pose a temporary concern for artifact loss. Yet long term implementation of the proposed action would benefit the resources by providing healthy vegetative cover for the sites by reducing fuel build-up that during a severe, high intensity fire, would destroy valuable cultural deposits.

Combined with those project listed on page 31 and 32 for a list of projects considered in cumulative effects analysis in this document, it is unlikely there would be a cumulative adverse effect to heritage resources or traditional cultural places. The effects would be similar to that described above with an overall decrease in the potential for unplanned wildfire events which could adversely affect the resources in consideration

GRAZING AND LIVESTOCK MANAGEMENT ALLOTMENT RESOURCES, RANGE CONDITION AND NON-NATIVE PLANTS

Affected Environment

This project area encompasses 5 grazing allotments: French Mesa Grazing Allotment, La Presa Grazing Allotment, Los Indios Grazing Allotment, Mesa Alta Grazing Allotment, and the Rio Chama Grazing Allotments.

The existing conditions of each allotment are based on the previous Range Environmental Analysis completed on the Coyote Ranger District. The existing conditions are categorized as range conditions which combine species composition, density, frequency, and vigor; apparent trend, and the condition of range improvements.

La Presa Allotment This allotment is approximately 11,000 acres in size with elevations ranging from 6,800 to 8,900 feet. The topography has primarily a north aspect with numerous small mesas and benches separated by shallow drainages and canyons, and grassland swales; Wildhorse and Mesa Laguna are the largest mesas. The vegetation overstory is primarily conifer forest at the higher elevations and north aspects with pinyon-juniper and oak woodlands, sagebrush and grasslands at the lower elevations.

One grazing permittee grazes the allotment with 39 cow/calf pairs and 1 bull from a period of June 1st to October 31st. The grazing system used is a Two-pasture Deferred Rotation system.

Los Indios Allotment

This allotment is approximately 7,500 acres in size with elevations ranging from 8,000 to 9,000 feet. The topography is primarily a mesa top dissected by shallow canyons and benches in which the benches break into steep cliffs along the Rio Chama Wilderness. The vegetation overstory is primarily ponderosa pine on the mesa tops with some mixed conifer on the side slopes and drainages. Piñon-juniper and oak woodlands (Gambel oak), snowberry, and Mountain Mahogany are common. There are very few riparian areas with Gallegos spring being the largest.

One grazing permittee grazes the allotment with 40 cow/calf pairs and 2 bulls from June 15th to October 31st. The grazing system is a Two-pasture Deferred Rotation system.

French Mesa Allotment

This allotment is approximately 22,000 acres in size with elevations ranging from 7,200 to 9,100 feet. The topography is relatively flat with mesas and extremely escarpments and vertical rock outcrops. The vegetation overstory is primarily Ponderosa Pine with some pinyon-juniper to the south and sagebrush and grasslands in the lower elevations. Riparian areas are limited to approximately 25 acres along Rio Capulin, 35 acres along the Rio Gallina, 60 acres El Valle, and 40 acres in Cañada del la Cueva.

Ten permittees graze the allotment with 213 cow/calf pairs and 10 bull from June 16th to October 31st. The grazing system is a Five-pasture Deferred Rotation system.

Most timbered areas have a high density of trees and shrubs which prevent the expression of a strong herbaceous understory of grasses and forbs. The high desert vegetation types of the Rincones and Lagunas area are becoming dense with sagebrush. A noxious weed survey has not been completed for this allotment, but populations of Canada thistle and Musk thistle exist throughout the allotment.

Rio Chama Allotment

This allotment is approximately 40,000 acres in size with elevations ranging from 6,200 to 7,500 feet. The topography is primarily a deep canyon that runs north south with high escarpments to the east and west and several canyons running perpendicular into it from the west. The vegetation overstory is primarily Salt cedar and willow at the river bottom gradually turning into sage brush flats to Four-wing saltbush, Mountain Mahogany, and Piñon-Juniper on the medium slopes. The Canyon to the west such as Ojitos canyon and La Presa have conifer stands. The Riparian areas are primarily along the Rio Chama.

Seven grazing permittees graze the allotment with 136 cow/calf pairs and 20 bulls from November 1st to May 15th. The grazing system is a Two-pasture Deferred Rotation system.

Most of the grasslands and untreated sagebrush communities are in fair condition with a static trend. A Shift in species composition back to western wheatgrass, needle and thread, and Indian Ricegrass was documented during a 1997 range analysis. The non grasslands are dominated by sagebrush. The riparian area along the Rio Chama is composed on healthy uneven-aged stands of cottonwood and native willows, often forming gallery forests along the river. There also small populations of Salt Cedar becoming established along the river down to the Abiquiu Reservoir. In addition there are several populations of Russian knapweed that are on the west bank of the Rio Chama.

Mesa Alta Allotment This allotment is approximately 37,000 acres in size with elevations ranging from 6,900 to 9,200 feet. The topography of Mesa Alta, as the name implies, are large mesa (elevated plains) composed of smaller mesas divided by shallow drainages and swales. The entire mesa is defined by extremely steep mountain sideslopes and vertical rock outcrop. . The lowlands are flats and badlands that are a part of the Piedra Lumbre basin.

The vegetation overstory is primarily Ponderosa Pine with some piñon-juniper on the high country and sagebrush and grasslands at low elevations. Riparian areas are limited to approximately 100 acres along segments of Salitral Creek and several hundred acres of valley swales in the narrow valleys in higher elevations.

Seven grazing permittee grazes the allotment with 190 cow/calf pairs and 10 bulls from May 1st to December 31st. The grazing system is a Two-pasture Deferred Rotation system.

Planned ignitions Probability and Range Capacity

Table 1.8 illustrates the number of acres that are likely to be burned within the 51,585 acre planned ignitions area. Steep slopes, riparian areas, non-forest vegetation types and piñon-juniper ecosystems are unlikely to be subject to planned and/or unplanned ignitions due to the limited fuels and the discontinuity of the fuels present. In general, where there are very steep terrain, badlands, and piñon-juniper woodlands; there is only 20-35 percent of any these areas that are likely to burn via planned and unplanned ignitions.

In general, full capacity rangeland indicates that there is sufficient forage and water available for livestock consumption. Potential capacity indicates forage is available but requires water, fencing, etc for livestock to use it. Capability indicated the potential to produce forage via planned ignitions and/or thinning of trees mechanically. No capacity rangeland indicates that there is no potential for livestock use either due to limited or no forage, steep slopes, lack of water, etc.

Full and Potential Capacity is indicative of vegetation and forage conditions that vary across the project area; some providing forage while others not. The majority of the Pine/Oak and Mixed Conifer is in potential capacity. Areas described as potential capacity provide the greatest opportunity for improvement through planned and unplanned ignitions.

Table 31 Treatment Probability and Range Potential

Vegetation or Slope Characteristic	Acres	Rx Fire Likely-Unlikely	Current Range Potential	Rationale
Non-Forested Grasslands	2,937	Unlikely	Full Capacity	Grasslands- Discontinuous fuels limit Rx potential
Piñon/Juniper	327	Unlikely	Full, Potential and Capable	Discontinuous fuels, limit Rx potential during favorable conditions
Pine/Oak	16,604	Likely	Full, Potential and Capable	Likely
Mixed Conifer	18,933	Likely	Full, Potential and Capable	Likely
> 40 % slope	12,734	Unlikely	No Capacity	High component of Rock Outcrop Discontinuous fuels limit Rx potential
Riparian Forested	2,938	Unlikely	Full Capacity	Cool Moister conditions than surrounding fuel type, requirements of “cool” or low intensity fire and discontinuous fuels limit Rx potential
TOTAL	51,583			

Alternative A. Proposed Action

Alternative A (No Action) would not implement planned ignitions at this time. Unplanned ignitions would be allowed to burn under appropriate conditions; however, without the benefit of planned ignitions, the landscape and the resources it contains would continue to be susceptible to catastrophic wildfire. The potential for catastrophic wildfire of moving across this landscape would not be diminished by deferring planned ignitions at this time.

Implementation of Alternative A would not implement planned ignitions within the allotments as described; therefore, there would be no affect the grazing operations, existing range improvements or range conditions. There would be no change in rangeland areas that are capable of producing forage, but do not because of closed canopy conditions. Browse communities of oak, mountain mahogany and other shrub species would not be diminished in height and remain unavailable and largely unpalatable. Rangeland conditions trends would remain on the existing direction with little opportunity for alternative areas for forage.

The allotments and the resources found there would; however, remain susceptible to unplanned ignitions that occur during wildfire conditions. Most of the range improvements, rangeland resources, and capable rangeland across these allotments could suffer severe affects due to wildfire. Burned boundary and pasture fences, trick tanks are common during wildfire. Earthen stock tanks would be breached and would remain useless for at least 10 years following the fire.

Direct and Indirect Effects

The approximately 35,538 acres of ponderosa pine and mixed conifer forest could burn with high severity resulting in a complete loss of the overstory and consumption of the understory litter and vegetation. These conditions would result in a long-term loss of the potential forage base and long-term effects on grazing operations.

Grasslands that currently have a large proportion of their population composition in Downy brome could burn under wildfire conditions, resulting in an increase in the spatial extent of populations. The soil disturbance created during high severity fire would make the burned areas more habitable for pioneer species such as forbs and invasive species such as Downy brome. Invasive weeds are likely to spread at a higher rate. Native plants may not exist leaving invasive and weedy forbs to dominate.

Because fires would burn hot, making all vegetation susceptible to mortality. A downward trend may follow the burned areas towards a very Poor Range Condition, because the soil may be sterilized, hydrophobic, and susceptible to erosion making these areas uninhabitable for native grasses.

Forest ecosystem would continue to “close-up” and continue to encroach into meadow communities further limiting the availability of forage that supports the livestock operation. The forage base is likely to follow up its current down ward trend with a slow reduction in available forage.

Range/Wildlife Improvement

There are 4 trick tanks, 12 spring developments with troughs, 3 corrals, and approximately 9 miles of fence that would remain susceptible to catastrophic wildfire without implementation of this project.

Non-Native Invasive Plants

Non-native invasive plants would not be affected through not implementing this project. Since planned ignitions would not be implemented of non-native invasive plants such as populations would not be affected. Their populations would like increase in spatial extent until adequate grazing management addresses the concern.

Introduction of non-natives is likely to be limited due to not having to bring heavy equipment into the area. Normal vectors such as wind blown, and those seeds brought to the area on vehicles visiting the forest along roads would continue to occur.

Alternative B. Proposed Action

The following effects analysis is focused on those areas where planned ignitions are likely to be initiated and encouraged, specifically the approximately 51,000 acres proposed for planned ignitions outside the wilderness. Much of the wilderness is one; unlikely to see fire due to fuels and slope characteristics and 2; those areas within the planned ignitions area are the most important when it comes to livestock management.

Direct and Indirect Effects

Planned ignitions would likely be initiated in 16,604 acres of ponderosa pine and 18,933 acres of mixed conifer that is largely in potential capacity, meaning that forage could be produced there should the forest canopy be thinned either by fire or mechanical means.

Forested ecosystems that currently do not produce insufficient forage to be allocated for livestock (< 250 lbs/ac) could produce sufficient forage at production greater than 250 lbs/ac following planned and unplanned ignitions of low and moderated severity. With a change in livestock grazing management, forage can be expected to increase from approximately <250 lbs/ac to 1000-1500 lbs/ac in ponderosa pine habitat, and between 1500-2500 pounds of forage in the mixed conifer habitat. These rates of forage production could be met within the first five to ten years following the initial entry with fire, if livestock managers rest the areas burned for at least one year, preferably two. The initial response from the understory would be dominated by native annual and perennial forbs. Native grasses presently in composition would become the dominant understory over time. Gambel oak and numerous other shrub species important to wildlife would be reduced in stature and re-sprout strongly following planned ignitions providing an important browse component for big game, and livestock.

There would be no effect to existing grasslands. Planned ignitions are not proposed for grassland communities for several reasons. One is the impact on grazing operation should fire consume the forage base. Second *Bromus tectorum* (downy brome) currently exists in several grassland communities and is growing in extent.

Because fires would burn at low to moderate severity, small diameter trees and brush would be susceptible to mortality allowing grasses to increase in composition. The planned ignitions and thinning projects that have been done on Mesa Camino demonstrate that a viable seed bank does exist in these high density conifer stands and a diversity of plants is likely to be expressed after fires. An upward trend may follow the burned areas towards better range conditions because of alternative sources of forage. Livestock and wildlife would gravitate towards these burned areas alleviating grazing pressure in areas that are historically grazed.

Since a seed bank of native herbaceous species currently exists and many of the species are present in composition, invasive weeds are unlikely to spread and may be reduced in its composition and spatial extent.

Grazing Operation

It is unlikely that grazing operations on these allotments would be affected by implementation of the project. Mitigation measure designed to limit effects to the existing forage base (not burning meadows) in meadow communities would prevent a loss of forage. Voluntary changes such as rest or deferment of burned areas would markedly improve the forage base.

Forage created in this project would not be allocated to livestock at this time. The newly available forage would offer opportunities for livestock operators to grazing livestock in different locations than historically; therefore, range trend could improve.

Non-Native Invasive Plants

Non-native invasive plants would not be affected through implementation of this project. Planned ignitions would not be implemented in populations of non-native invasive plants such as populations to prevent their spread to adjacent area.

All heavy equipment and firefighting equipment (ATVs, engines, dozers, etc.) would be pressure washed of mud and debris, further reducing the potential spread of non-natives.

Range/Wildlife Improvements

Range improvements that are susceptible to fire (fences, trick tanks, etc) would be thinned around and fuels removed prior to initiation of planned ignitions in order to protect the investment and to

maintain their usefulness on the allotments for range and wildlife purposes. There would be not effect to the condition, function or viability of existing rangeland or wildlife habitat.

CUMULATIVE EFFECTS

Please see Table 12 page 37 for a list of projects considered in cumulative effects analysis in this document.

Alternative A (No Action)

The cumulative effect of not implementing this project would be the continued susceptibility of the range and forest ecosystems to catastrophic fire. The effects of which could disrupt grazing operations and the forest base for decades.

Although improvement in vegetation condition is likely to continue via on-going projects such as the Mesa Alta, Gallina, Mesa Poleo and Golondrino Mesa projects; there would be no cumulative improvement in wildlife habitat or the reduction for the potential of catastrophic wildfire.

Alternative B (Proposed Action)

The cumulative effect of implementing this and other projects planned on this landscape would be an improvement in the overall forage base as thousands of acres of currently closed forest are “open-up” by planned ignitions. The cumulative effect for range would be contained to the allotment itself and not include adjacent allotments. Projects that cumulatively contribute to the forage base include the Mesa del Camino Wildlife Habitat and Forest Health Thinning and Planned ignitions project, and the Golondrino Landscape-Wide Planned ignitions project north of this project area.

This project combined with other projects, including the Gallina Wildland Urban Interface project (Phases I and II), the Mesa Poleo Wildland Urban Interface Project (Phases I and II) and the planned Cordovas Forest Health Project would cumulatively contribute to the forage base for wildlife and livestock over a very larger geographic location.

ENVIRONMENTAL JUSTICE

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

Affected Environment

The Rio Chama Planned Ignitions and Wildlife Management project is located in Rio Arriba County, New Mexico. As of the [census^{\[3\]}](#) of 2000, there were 41,190 people, 15,044 households, and 10,816 families residing in the county. The [population density](#) was 7 people per square mile (3/km²). There were 18,016 housing units at an average density of 3 per square mile (1/km²). The racial makeup of the county was 56.62% [White](#), 0.35% [Black](#) or [African American](#), 13.88% [Native American](#), 0.14% [Asian](#), 0.11% [Pacific Islander](#), 25.62% from [other races](#), and 3.28% from two or more races. 72.89% of the population were [Hispanic](#) or [Latino](#) of any race.

There were 15,044 households out of which 36.90% had children under the age of 18 living with them, 48.80% were [married couples](#) living together, 15.90% had a female householder with no husband present, and 28.10% were non-families. 23.50% of all households were made up of individuals and 7.80% had someone living alone who was 65 years of age or older. The average household size was 2.71 and the average family size was 3.19.

In the county the population was spread out with 28.60% under the age of 18, 8.90% from 18 to 24, 28.80% from 25 to 44, 22.90% from 45 to 64, and 10.90% who were 65 years of age or older. The median age was 34 years. For every 100 females there were 98.00 males. For every 100 females age 18 and over, there were 97.70 males.

The median income for a household in the county was \$29,429, and the median income for a family was \$32,901. Males had a median income of \$26,897 versus \$22,223 for females. The [per capita income](#) for the county was \$14,263. About 16.60% of families and 20.30% of the population were below the [poverty line](#), including 23.30% of those under age 18 and 22.90% of those age 65 or over.

Environmental Consequences

Implementation of either of the alternatives evaluated in this EA would not result in adverse impacts to environmental resources and socioeconomic conditions of this county or that of the surrounding communities. Therefore, disproportionate direct, indirect, or cumulative adverse impacts on low income or minority populations would not occur.

CHAPTER IV
CONSULTATION AND COORDINATION

The Forest Service consulted with the following individuals, Federal, state and local agencies, and non-Forest Service persons during the development of this project.

Name	Title	Participation
Andrew Serrano	District Fire Management Officer	Project Lead
Anne Baldwin	Zone Archaeologist	Planning, Survey and HR Effect Analysis
Freddie Velasquez	Range Technician	Range Data
John Dixon	Former Soil/Hydrologist	Soil and Hydrology Effects Analysis
John Phillips	Resource Planning Staff	IDTeam Leader/Writer/Primary Contact
Lawrence Atencio	Range Staff	Consultant
Mark Martin	District Archaeologist	HR Survey Team Leader
Mary Orr	Zone Biologist	Planning and Wildlife Effects Analysis
Ruben Leal	Former Range Staff	Range Management Effects Analysis
Ted Benson	Recreation Staff	Consultant/Recreation Effects Analysis
William Armstrong	Forest Assistant Fuels Manager Officer	Fuels Data Collection, Modeling, Planning and Effects Analysis
Jennifer Cramer	Forest NEPA Coordinator	Editorial Review/NEPA Sufficiency
Robert Morales	Forest Fire Management Officer	Policy/Editorial Review
Mark Bremer	Forest Archaeologist	HR Survey Report and SHPO Liaison
List of other Agencies Consulted		
New Mexico Department of Game and Fish		
New Mexico Environment Department		
New Mexico State Historic Preservation Office		

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