United States
Department of
Agriculture

Forest Service

Grand, Mesa, Uncompahgre, and Gunnison National Forests
Gunnison, CO

PERFECTO CREEK

TIMBER SALE

PROJECT

Environmental Assessment
Saguache County Colorado

March, 2007

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SUMMARY

The Grand Mesa, Uncompahgre, and Gunnison National Forest (GMUG) proposes to conduct Vegetation Management on National Forest Lands by using the Forest's commercial timber sales program treating up to 910 acres on spruce-fir and spruce-fir/aspen sites within a 3,565 acre area. The project known as the Perfecto Creek Timber Sale proposes to close approximately 3.2 miles of National Forest System Road (NFSR) and reconstruct 6.6 miles of existing system road. In addition 1.25 miles of temporary road is proposed to access treatment sites. Approximately 0.3 miles of system roads within the Project area would be decommissioned. The Perfecto Creek Timber Sale project is located near Stewart Peak approximately 32 air miles south of Gunnison, Colorado and is within the Gunnison Ranger District of the Gunnison National Forest. This action is needed to meet the goals of the GMUG Land and Resource Management Plan as amended. These goals include timber production and increased forest health and diversity.

The proposed action may increase road maintenance needs along the Cochetopa Creek Road (NFSR 794) during the life of the project. The project could reduce the amount of old growth habitat existing within the project area. Forest Plan standards for old growth retention would continue to be met and a cycling of old growth habitats maintained in the future. The proposed activity may affect a short-term increase in noxious weed species within the project area. Monitoring and treatment to control the establishment and spread of noxious weed species would continue to be carried out. The project could also cause a short-term increase in sedimentation levels. Project design standards provide measures necessary to protect aquatic ecosystems and maintain beneficial uses of water. Soil productivity would be maintained and long-term improvements in water quality could be realized through a reduction in the overall road density and by correcting resource damage on existing roads.

In addition to the proposed action, the Forest Service also evaluated the following alternatives.

-No Action, management activities and the transportation system would continue under existing policies.

- Commercial Vegetation Management with Old Growth Retention and Aspen Stand Improvement. This alternative was considered in response to the issue of maintaining wildlife habitat and retaining an additional continuous area for old growth dependent species.

Based upon the effects of the alternatives, the Responsible Official will decide:

-Whether or not to harvest timber, complete road reconstruction, road closures and road decommissioning on National Forest lands within the project area.

-If an action alternative is selected, under what conditions and by which methods timber harvest and associated activities would be conducted.

Chapter 1 - INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

-Introduction: The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving the purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

-Comparison of Alternatives, Including the Proposed Action: This section 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 significant issues raised by the public and other agencies. This discussion also includes specifications for project implementation (design criteria) and possible mitigation measures if needed. Finally, this section provides a table comparing project issues by alternative.

-Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.

-Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

-Appendix: The appendix provides additional information to support the analyses presented in the environmental assessment.

Background

The project area under consideration is located approximately 32 air miles south of Gunnison, Colorado. The project is known as the Perfecto Creek Timber Sale proposal. The project area encompasses an estimated 3,565 acres. It is defined by Perfecto Creek on the north, the La Garitia Wilderness boundary on the west, Nutras Creek and the 1977 RARE II roadless area boundary on the southeast. This project does not propose to conduct any activity in either of the adjacent Roadless or Wilderness Areas. See Map 1, Appendix A.

The management emphasis for the Perfecto Creek project area as identified in the Amended Land and Resource Management Plan for the Grand Mesa, Uncompahgre and Gunnison National Forests, is Timber Management and Livestock Grazing. Pursuing direction contained in the Forest Plan, following field reconnaissance in the area the Gunnison Ranger District placed the project on the district's out-year timber sale plan in 1992. The project was held as an out-year proposal until 2002 when it was moved to the 5-year timber sale plan for the Gunnison District.

Silvicultural and forest health evaluations conducted during the 2004 field season determined that timber stands in the project area are at risk from spruce and Ips bark beetles. The incidence of stem decay is also unusually high in the timbered stands of Perfecto Creek. Spruce broom rust is well distributed throughout the area causing growth loss, infection by decay fungi, and mortality. Although aspen is usually a minor component it is fairly common in the area. On many sites the aspen species is suffering from competition and diseases that typically attack older trees such as white trunk rot and various cankers. Aspen inclusions that exist within the project area provide habitat for a variety of wildlife species. Maintenance of these inclusions is critical to providing valuable wildlife habitat and diversity in the area.

Purpose and Need for Action

The purpose and need of this initiative is to apply silvicultural treatment to stands in the Perfecto Creek project area moving them toward a healthy, more vigorous and diversified condition. There is a need to decrease the risk of insect and disease infestation to provide improved stand health both now and in the future. There is a need to follow-up on silvicultural treatments previously initiated in the Perfecto Creek area to continue long-term improvements in stand health and vigor. There is a need to promote diversity on sites within the project area to provide a balance of species and habitat. There is also a need to provide commercial forest products from National Forest lands suitable for such purpose to local dependent industries. The Gunnison Ranger District proposes to utilize the commercial timber sales program to accomplish these goals as stated on pages III-1 through III-5 of the Forest Plan. The Perfecto Creek proposal would also provide opportunities to accomplish or improve upon several other goals stated in the Forest Plan. The project could help create a supply of personal-use firewood for local residents. It would help provide economic stability for local timber industry dependent on forest outputs. Improvements of livestock forage conditions could be accomplished in a portion of the forest that emphasizes livestock grazing. Enhancement of wildlife habitat diversity could be accomplished. An inventory of old growth stands would be completed providing an opportunity to implement silvicultural practices that would maintain or establish an appropriate balance of old growth values. The local transportation system would be analyzed to evaluate opportunities to provide the most efficient, economical, and environmentally sound system serving management needs in the area. Water quality and soil productivity would be protected and recreation opportunities would be maintained at current levels.

Proposed Action

The Perfecto Creek Timber Sale would harvest timber on National Forest lands treating an estimated 910 acres of conifer-dominated sites within the area described (refer to the enclosed Map 2 in Appendix A). This project would occur in Sections 10, 11, 14, 15, 16, 17, 20, 21, 22, 27, 28 and 33, of T44N, R1E, New Mexico Principal Meridian. Principal access to the sale would be from the Cochetopa Creek Road, National Forest System Road (NFSR) 794. This road would also provide the haul route by which timber would potentially be removed from the project area.

Road Reconstruction and Closure

The project proposes to reconstruct approximately 6.6 miles of existing roads to improve safety, drainage, alignment, and to apply spot surface material. An estimated 1.25 miles of temporary road construction would be needed to access forest stands to be harvested. Although the project area currently has roads in place, some stands or portions of stands proposed for harvest are currently not adjacent to existing roads and some existing roads do not meet standard conditions necessary for safe operation. The Perfecto Creek project would close and place into storage approximately 3.2 miles of existing roads when the project is completed to reduce erosion, maintenance costs, and open road densities in the project area. These roads would be closed to all wheeled vehicle traffic. The full length of NFSR 794.2B1 and NFSR 794.2D, and a portion of NFSR 794.2H would be closed. The proposal would also decommission an unneeded 0.3-mile section of NFSR 794.2H. This section of road is currently located behind a closed gate and considered in storage.

Commercial Vegetation Management

This project would produce an estimated 7,267 hundred cubic feet (CCF) of timber. Harvesting would be carried out through one commercial timber sale. Group selection would occur on approximately 910 acres, individual tree selection would occur on approximately 61 acres, a three step group shelterwood (2^{nd} entry) would occur on approximately 17 acres, a two step group shelterwood (1^{st} entry) would occur on approximately 37 acres and a salvage and sanitation treatment would be used on approximately 8 acres. Additional treatment would focus on maintenance of aspen inclusions in the project area by removing conifer species that are encroaching upon and/or suppressing the aspen component. This treatment would be implemented on an estimated 40 acres as shown on Map 2 in Appendix A. The objective of maintaining aspen would also be carried into the group selection and group shelterwood treatments, where occasional opportunities exist to promote the aspen species. The timber would be removed using ground-based logging systems, and no harvesting would occur in the Water Influence Zone (WIZ). Logging slash within harvested stands would be lopped and scattered across the sites. Unmerchantable green spruce logs (YUM) would be brought to the landing, machine piled and burned along with other landing slash in order

to prevent future spruce beetle colonization in slash material. All landing slash will be piled and burned. Natural regeneration would be planned on all harvested sites. This would be accomplished through machine scarification on the sites to create a seedbed and micro-site conditions needed for the establishment and survival of seedlings. The timber would be offered for competitive bid on the open market, prepared and harvested according to current Forest Service procedures and contractual requirements.

Sale Area Improvement Projects (KV)

The Knutson-Vandenberg Act provides for the use of excess timber sale receipts (KV funds) to conduct sale area improvement work, including wildlife habitat enhancement. Utilizing this potential funding source, the following activities are proposed:

Silviculture

- Site Preparation (priority 1)
Machine scarification would be completed to create a seedbed for natural regeneration on group selection treatments.

- Regeneration Surveys (priority 2)
Under Alternatives 2 and 3, reforestation exams would be accomplished by utilizing KV funds.

- Weed Monitoring (priority 3)
The timber sale area would be surveyed for two years for noxious weeds. Treatments would be used as appropriate to control populations of noxious weed species during this time period.

- Supplemental Reforestation (priority 4)
Reforestation of 12 acres of past regeneration failures would occur. Activities would include machine scarification and planting.

Watershed improvement

- Erosion Stabilization (priority 5)
Chronic hillslope and channel erosion along NFSR 794 in Section 22, T44N, R01E has been and continues to be a significant source of sand size sediment moving into Chavez Creek, which is a perennial and fish bearing stream. The road has also been a factor in capturing, concentrating and routing water. Improvements in road drainage have been made in the recent past.

The project will reduce this erosion by improving vegetative ground cover and building hillslope and channel sediment retention structures. Structures would be constructed using a combination of designs that include: native materials (log and rock), rock gabion baskets, weed free straw hay bales or excelsior logs. Revegetation would be

accomplished with native species. Site fertility and moisture limitations may require the use of mulch and fertilizer. Some mechanical site prep may also be required. Estimated cost is based upon installation of 100 small hillslope detention structures at $50 each; ten larger in-channel structures at $500 ea.; re-vegetation treatments over 15 acres at $250/acre. All cost included estimates for labor, equipment and materials. Total funds to be collected would be $13,750.

- road closure (priority 6)
Most road closures planned for the project will be conducted by the purchaser under the terms of the timber sale contract, however there are 0.3 miles of road decommissioning and 0.4 miles of road storage that are not eligible for inclusion in the contract. This 0.7 miles of road closure work will be funded with KV money.

- non-commercial vegetation treatment to improve diversity (priority 7)
The riparian meadows of the Perfecto timber sale have trees becoming established within what historically was a non-timbered area. This most likely has occurred with the prevention of wildfire in the area over the past 100 plus years. If not addressed, trees will continue to increase into the area eventually shading out the understory species that provide for stream health and wildlife habitat. Under this project encroaching trees will be cut down. Slash will be loped and scattered as necessary.

Decision Framework

The Council on Environmental quality (CEQ) regulations implementing NEPA require that federal agencies consider three types of actions: 1) connected actions, which are two or more actions that are dependant on each other for their utility; 2) cumulative actions, which when viewed with other proposed actions may have cumulatively significant effects, and should therefore be analyzed together; and 3) similar actions, "which when viewed with other reasonably foreseeable or proposed actions, have similarities that provide a basis for evaluating their environmental consequences together." (40 CFR 1508.25(a)).

The scope of actions to be addressed in this analysis is limited to timber harvest in the Perfecto Creek area of the Gunnison National Forest. In addition, the scope of the proposed action is limited to road reconstruction, temporary road construction, road decommissioning, slash treatment in support of natural reforestation, design criteria and mitigation measures deemed necessary to reduce any environmental effects of the projects. These activities are similar actions and therefore, are considered together in accordance with CEQ regulations.

This EA documents analysis of site-specific, on-the-ground activities. It is not a general management plan for the Perfecto Timber Sale area or the associated watersheds. The analysis is tiered to the Grand Mesa, Uncompahgre and Gunnison Forest Plan Final Environmental Impact Statement and Record of Decision (Forest Plan). It does not reanalyze management area allocations already specified in the Forest Plan nor does it

seek to reexamine federal regulations or Forest Service policy regarding timber harvest on National Forest lands. This EA is not a decision document. It does not identify the alternative to be selected by the Responsible Line Officer. This document discloses the environmental consequences of implementing the proposed action and alternatives to that action. The Gunnison District Ranger is the Deciding Official. His decision will be stated in the Decision Notice. Given the purpose and need, the Gunnison District Ranger reviews the proposed action and the other alternatives in order to make the following decisions:

1. Whether or not to harvest timber, complete road reconstruction, and road decommissioning on National Forest lands within the project area.

2. If an action alternative is selected, under what conditions and by which methods timber harvest and associated activities would be conducted.

Scoping and Public Involvement

Scoping is a process designed to determine the potential issues associated with a proposed action and then from this list further identify those issues that are substantial and relevant to the decision (40 CFR 1501.7). First, comments are obtained from interested and affected parties, both within and outside the agency, to develop potential issues that should be considered. Second, these "potential issues" are reviewed by the interdisciplinary team to determine: 1) substantial issues to be analyzed in detail; and 2) the issues that are not substantial or that have been covered by prior environmental review and should be eliminated from detailed analysis.

The proposal was listed in the Schedule of Proposed Actions for the GMUG National Forests, and was submitted for comment to the public and other agencies in March of 2005. This notice fulfills the requirements of 36 CFR 215.1b & 215.6, and was done by letter and by published notice in the Gunnison Country Times newspaper.

The purpose of scoping is not only to identify a list of issues and concerns regarding a proposal, but also to determine the substantial issues to be analyzed in depth. The substantial issues become the focus of the interdisciplinary interaction and alternative development process. NEPA provides for the identification and elimination from detailed study of those issues that are not substantial or have been covered by prior environmental review, thus narrowing the discussion of those issues to a brief statement as to why they would not have a substantial effect on the human environment or by providing reference to their coverage elsewhere (40 CFR 1501.7(3)).

Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated issues identified during the internal and external scoping process into two groups: Non-significant and Significant issues. 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; 4) conjectural and not supported by scientific or factual evidence; or 5) general comment, opinion, or position statement. The council on Environmental Quality (CEQ) NEPA regulations require this delineation in section 1501.7.*"…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Section 1506.3)…"*. A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the Perfecto Creek Timber Sale Response to Comments (Appendix B).

Significant issues were defined as those potential or actual adverse impacts directly or indirectly caused by implementing (or failing to implement) the proposed action. They are discussed in detail because: 1) they are potential factors in deciding among alternatives; 2) they are topics of high public interest; or 3) another law, regulation, or policy requires their analysis such that full disclosure was determined to be appropriate. Each of these issues is summarized below.

Issue 1. Forest stand health/insects and disease. Large areas of forest with mature structure and increasing incidence of insects and diseases could reduce the overall productivity of the sites for timber production and/or lead to large scale mortality if new disturbance is not introduced to create tree regeneration and age class diversity.

Issue 2. USFS mandate to provide wood products from suitable lands. There is a limited amount of National Forest Land classified and selected to be suitable for timber production; 176,414 acres of conifer and 24,453 acres of aspen on the Gunnison Ranger District (GMUG NF LRMP, 1991). We are directed to provide wood products by the GMUG Land and Resource Management Plan (LTSY 40.8 MMBF/year [~ 81,600 CCF]) in accordance with the NFMA and MUSY laws. Harvest levels on the GMUG have been well below this planned level, and postponing or canceling this entry would further increase this gap.

Issue 3. Follow-up treatments on past silvicultural activities. Silvicultural treatments have been initiated in the past and are now ready for the next phase of the prescription. If the treatment regime is not continued, the public would not capture the full benefit of these investments in the forest stands and roads of the area.

Issue 4. Wildlife habitat/TES species. Vegetative treatments could cause an adverse impact to TES, MIS and/or sensitive species through direct disturbance or changes to their habitats. Of particular concern is the expected post harvest level of old growth stands within the analysis area (11.5%) - if the proposed action were implemented. A reduction of the old growth forest component on the landscape could adversely impact wildlife species that benefit from old growth forest structure. Further, old growth

fragmentation could occur if treatments reduce the old growth character of the existing stands.

Issue 5. Transportation and safety. There is a need to provide a safe and environmentally sound transportation system within the project area. The transportation system may need improvements or corrections which should be addressed in any proposed action alterative.

Issue 6. Road closure effectiveness. New roads created to transport wood products could create unauthorized travel corridors if closure procedures are not effective.

Issue 7. Invasive species spread. Invasive species of concern could establish and spread on sites disturbed through timber harvesting activities.

Issue 8. Soil erosion. Project activities could impact erosive soils and/or unstable slopes that may exist within the project area.

Chapter 2 – ALTERNATIVES, INCLUDING THE PROPSED ACTION

Following completion of scoping and issue analysis, the interdisciplinary team of resource specialists met to discuss the list of substantial issues and to develop a range of alternatives that would clearly address those issues. A total of five alternatives were discussed, three of which were identified for detailed study including the proposed action and the no action alternative. This section includes a description of each alternative considered. A map reference for each action alternative is located in Appendix A (map 2 & 3).

Alternative 1 – No Action

The NEPA requires consideration of a No Action alternative (40 CFR 1502.14d) where none of the proposed actions identified in Chapter 1 would occur. This alternative provides a baseline of comparison to aid in determining the significance of issues and effects of the proposed action. Under this alternative, no commercial timber harvest, road reconstruction, or road closure would occur. The existing road conditions would be maintained in the project area. Management activities would continue under current policies.

Alternative 2 – Proposed Action – Commercial Vegetation Management

This alternative is the proposed action described in Chapter 1. It is the initial proposal developed to meet the project purpose and need. This proposal is slightly different than the original proposed action presented in our scoping letter sent on March 31, 2005 due to silvicultural modifications and the decision not to harvest any trees from the WIZ. More detailed field analysis revealed areas where a different silvicultural treatment would be more effective at meeting the objectives of this project. The modifications consist of, changing 54 acres (6% of the area) from a group selection treatment to a group shelterwood, changing 8 acres from a group selection treatment to a salvage and sanitation treatment and removing 83 acres due to unsuitable ground conditions and dropping the overstory removal units from the proposal. Overall, it was determined by the interdisciplinary team that these changes were not significant enough to justify the creation of a new alternative.

Alternative 3 – Commercial Vegetation Management with Old Growth Retention and Aspen Stand Improvement

This alternative was developed in response to the issue of providing more old growth stand structure as wildlife habitat. It maintains a corridor of old growth within the project area. Keeping this corridor unaltered will help to maintain a larger percentage of the landscape in the old growth state and would provide a travel corridor to wildlife species

that use old growth forest habitat. In addition to old growth forest structure retention, this alternative would add 67 acres of aspen rehabilitation treatment. Harvesting would be carried out through one commercial timber sale, and would require an estimated 0.8 miles of temporary road construction. As with Alternative 2, all temporary roads will be closed upon completion of the treatment. This treatment would remove an estimated 5,776 CCF of sawlog material and small wood products other than logs from 780 acres within the project area. Overall, silvicultural treatments would be similar to Alternative 2, with the exception of more aspen stand improvement and less area of group selection. Specifically, group selection would occur on approximately 550 acres, individual tree selection would occur on approximately 61 acres, a three step group shelterwood (2^{nd} entry) would occur on approximately 17 acres, a two step group shelterwood (1^{st} entry) would occur on approximately 37 acres, a salvage and sanitation treatment would be used on approximately 8 acres, and aspen rehabilitation would occur on approximately 107 acres. All other treatment activities would be identical to those described in Alternative 2 including road reconstruction and closure, site preparation, and slash treatment. Refer to **Map 3** in Appendix A for a display of treatment units and corresponding prescriptions.

Alternatives Considered But Eliminated From Detailed Study

- Commercial treatments with a greater emphasis on road closures. Possible projects would have included closing NFSR 794.2M and/or reconstructing the crossing at Chavez Creek.

- More aggressive aspen treatments. Initiating coppice cuts in aspen stands to renew stand health and vigor and to increase age class diversity. These treatments would require protective fencing or other measures to protect aspen sprouts.

- Removing the overstory from previous regeneration cuts. Advanced regeneration likely would have been damaged under these treatments.

These alternatives were eliminated from detailed study because they did not offer a unique opportunity to meet the purpose and need of the project, as compared to the alternatives we analyzed, and would therefore be largely redundant. The proper method for approaching consideration of alternatives is to consider first the primary purposes that the project is to serve [Sierra Club v. Froehike, D.C. Tex. 1973, 359 F. Supp 1289]. The range of alternatives need not extend beyond those reasonably related to the purpose of the project [Trout Unlimited v. Morton, C.A. Idaho 1975, 509 F. 2d 1276]. While these alternatives could meet the purpose and need of the project, they did not directly address the issues that were identified during scoping.

Project Design Criteria Common to All Action Alternatives

The following design elements include guidelines that come from Forest Service Manual or Handbook policy, standard contract language, or Forest Plan guidelines. These items are considered to be standard management practice as provided by the aforementioned sources and would be applied to all action alternatives. They are listed by the resource title for which they apply. This in not an all inclusive list, it is provided to highlight those practices that relate to our analysis and the issues identified during scoping.

Water Quality

There will be no planned harvest within the Water Influence Zone (WIZ). The WIZ is defined as 100 feet either side of the streambank for perennial and intermittent streams. The boundaries for the WIZ will be defined during layout for treatment units 5, 6, 8, 9, 10, 11 and 12. Incidental harvest of trees may occur when needed for skid trail or road crossings.

No ground based logging equipment, landings or work areas will be permitted within the WIZ, unless necessary for skid trail or temporary road crossings. All crossings will be perpendicular to the stream. At least one end of the log would be suspended during skidding across the WIZ. Trees would be felled in a way that protects vegetation in the WIZ from damage.

All skid trails and landings will be checked by Forest Service inspectors at the conclusion of logging operations and evaluated to ensure the requirements of the WCP Handbook have been met. If needed corrective measures will be implemented. Stabilization requirements may include water barring; blockage at intersections with roads; ripping; application of slash and organic matter to disturbed sites; and seeding with desirable species.

All perennial and intermittent streams will be identified as protected streamcourses in the timber-sale contract and thus require the review and approval of suitable crossings for either skid trails or temporary roads. No temporary structures in the channel will be permitted to remain at the end of the normal operating season, unless agreed upon with the Forest Service representative. During temporary road construction, initial clearing operations will contain material on-site or remove it from the WIZ.

Should any road re-construction or heavy maintenance be required on an existing system road, within the WIZ, all material must be retained within the road prism or be removed from the WIZ.

The full length of all newly constructed temporary roads would be closed to a “Level 6” specification as defined in the EMS operational controls for road decommissioning (EMS-4.4.6-001-NO). Level 6 includes: re-contouring road prism (slopes and shoulders) and seed with natural species. Drainage crossings will be fully restored.

Road surfaces and ditches will divert water prior to intersecting the stream. Road drainage water will be discharged into either natural or constructed sediment filters/traps.

No ground disturbing operations will be allowed in ephemeral drainages except at designated crossings. Crossings would be perpendicular to the stream. At least one end of the log would be suspended during skidding across the channel. Trees would be felled in a way that protects vegetation in the channel from damage.

Range

Fences should be avoided if at all possible from being included into a cutting unit.

Temporary roads constructed through any fence should have a gate installed that can be closed when not in use or after shifts when cattle are within the area.

If skidding through a fence is necessary the fence should be cut and pulled back out of the way along the uncut portion of the fence. Gaps should be wide enough to ensure that equipment or loads do not snag any part of the fence. Fences should be repaired as soon as practical following harvest activity in that immediate area.

The sale area administrator would coordinate with rangeland personnel letting them know as soon as possible expected operations that would occur where fences would need to be breeched or where temporary roads are planned through fences.

The purchaser or their agent would notify the sale administrator prior to cutting any fence.

Contract provision BT6.35, Equipment Cleaning, is a mandatory provision that would be used to assure that logging equipment entering the project area would not introduce any risk of undesirable seed from noxious weed species into the area.

Recreation

See the mitigation section below.

Wildlife

Maintain a minimum of 300 snags/100 acres from the largest dbh available, large live trees with broken or dead tops (snag replacement trees), and other trees showing wildlife signs (dens, nests, cavities, squirrel middens, woodpecker activity) within and adjacent to harvest units to provide for perching, foraging, roosting, and nesting sites for wildlife. To compensate for the lack of snags along road corridors due to removal for OSHA safety needs, leave a greater density of wildlife trees in areas away from roads and landings. Snags within 500 feet of water (creeks, ponds, wet meadows, seeps, and springs), meadows/parks/forest openings, and ridge tops are particularly valuable to wildlife. Retain snags in groups when possible to avoid windthrow and provide better wildlife cover. Where possible in shelterwood units, attempt to link groups with advanced regeneration to minimize open area. Utilize natural sinuosity or drainages for linking groups. Leave snags with a variety of heights, shapes, and decay condition. Generally,

taller and larger diameter snags provide better habitat for more species. Leave snags of all species type. Aspen snags are especially valuable and, where feasible, all aspen snags which are not a distinct hazard should be retained to help maintain populations of cavity dwelling wildlife. In addition to aspen snags, retaining live aspen trees with heartwood decay will benefit the red-naped sapsucker. Protect standing wildlife trees from damage during site preparation and post sale activities.

Maintain 10-20 tons per acre of coarse woody debris within harvest units to maintain soil moisture at ground level for mosses, fungi, and lichens and to encourage faster re-colonization of harvest units by small mammals and other prey species. Retain some small slash piles to provide habitat for small mammals. Unless operations are obstructed, leave existing pre-harvest logging debris piles where they are located within forest habitats away from roads, to provide small mammal habitat and potential denning sites for lynx and American marten. Where possible in regeneration units, create piles of logs, stumps, or other woody debris to minimize the effects of larger openings and to provide connectivity to adjacent stands for lynx, marten, and other species that may generally avoid open areas and utilize concentrations of down wood for foraging or denning.

Maintain large diameter downed logs in various stages of decomposition within harvest units (50 linear feet/acre of 10 inches diameter or larger at the large end of lodgepole pine and aspen logs and/or 12 inches diameter or larger for spruce and fir logs) to provide habitat for small mammals.

Retain other trees showing wildlife signs (dens, nests, and cavities), especially trees or groups of trees with squirrel nests and middens, within and adjacent to harvest units to provide for perching, foraging, roosting, nesting, and denning sites for lynx prey species. Link harvest units and group selection cuts within harvest units with forested areas greater than 200 feet wide and utilize natural sinuosity or drainages when possible.

Do not allow skidding, log landings, log decks, or logging equipment to be operated or located in sensitive habitat such as elk wallows, riparian areas, ponds, seeps, springs, or other wet areas except at designated crossings. Avoid these areas when designing cutting units and road locations.

Maintain screening for wildlife where possible between cutting units and roads or meadows. Maintain buffer strips of adequate screening a minimum of 200 feet wide unless topographic breaks occur between cutting units and roads or meadow openings.

Soil Productivity

To Protect and Maintain Soil Productivity: Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15% of any land unit. Consider past management activities.

Restrict roads, landings, skid trails, concentrated-use sites, and similar soil disturbances to designated sites.

Operate heavy equipment for land treatments only when soil moisture is below the plastic limit, or protected by at least 1 foot of packed snow or 2 inches of frozen soil.

Keep ground vehicles out of wetlands. Do not disrupt water supply or drainage patterns into wetlands.

Enough slash and unmerchantable material would be left on site and scattered in such a way that it acts as an effective ground cover preventing excessive runoff and soil erosion. If measures designed to control accelerated runoff and erosion are estimated to be ineffective or not feasible, activity on those areas would be avoided.

Conduct logging to avoid concentrations of water. Disperse runoff as needed.

Transportation System

Temporary roads would be closed ("Level 6") immediately after the completion of project activities. A "Level 6" closure specification is defined in the EMS operational controls for road decommissioning (EMS-4.4.6-001-NO).

A surface rock replacement deposit would be collected for NFSR 794. Commensurate maintenance deposits or work would be required on existing haul routes.

Timber hauling operations would be restricted during wet or thawed conditions to protect the road surface.

Safety signing would be used to alert the public that logging operations are in progress and would meet the requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

Gated roads would remain closed to the public during timber sale activities.

Roads that have been identified for closure would be signed to notify the public that closure would take place following the completion of timber sale activities.

Silviculture

All unutilized green spruce logs that are eight inches or larger in diameter and eight feet or longer in length will be brought to the landing, piled and burned within one season after cutting.

Mitigation Measures Common to All Action Alternatives

Recreation

New dispersed campsites in environmentally desirable locations will be established to accommodate displaced dispersed campers due to road closures.

Effectiveness: *This mitigation is designed to create dispersed camping opportunities within the sale area. The district has established dispersed camp sites in the past with success. This has been accomplished if necessary with signing or defining camp sites or*

parking areas through boulder placement or other barriers. There is no reason to conclude that this technique will not be effective within the Perfecto Creek Timber sale area.

Wildlife
If additional territories of management indicator, sensitive species, raptors, or other species of concern are discovered within the Perfecto analysis area, coordinate with the District wildlife biologist to establish and manage these territories with adequate buffer zones and seasonal activity use restrictions around breeding sites to prevent the disturbance or displacement of those individuals.

Effectiveness: *This mitigation is designed to provide some level of protection for sensitive or other species that may be discovered after the sale contract has been completed or during actual operations. Anecdotal evidence suggests that after the fact buffers and timing restrictions have been successful in ensuring the success of a nest site the year it is discovered. In two known instances where buffers and/or timing restrictions on newly discovered goshawk nests were utilized, both nests successfully produced fledglings the year of discovery (Jackson, Lefevre, pers. comm.).*

Monitoring

Monitoring occurs at two levels: the programmatic or Forest Plan level and the project specific level. Following are several monitoring activities relevant to this project.

Project Implementation
General implementation of the project (sale and road design, contract preparation, contract administration, and implementation of design features and mitigation measures) would be completed by qualified Forest Service personnel and reviewed by the District Ranger and staff on an as needed basis and as specified in the GMUG Environmental Management System. Contract administration would be conducted on a regular basis and as needed to obtain acceptable contract performance. The District Ranger would review and approve project development after completion of each major step according to Forest Service procedures and guidelines.

Noxious Weeds
Disturbed areas, such as roads, landings, and skid trails, would be monitored for noxious weeds. Chemical, biological, cultural, and mechanical techniques would be used as appropriate to control populations of noxious weeds as described in the 1995 EA for the Gunnison District Weed Management Program. All treatments of noxious weeds would follow state and federal regulations.

Reforestation
Regeneration surveys would be conducted on harvested sites during the first, third, and fifth years after treatment. Should this monitoring conclude that additional cultural treatments are required, these treatments would be applied.

Soils and Water
Monitoring soil moisture conditions during harvest activities to assure that heavy equipment use is only occurring during periods of time when the soil is dry enough to support this use without excessive impact. Monitoring would be performed by the Timber Sale Administrator in coordination with the Forest Soil Scientist.

Wildlife
Species-specific monitoring would continue in the project area to validate the effectiveness of design features and to determine if species responses to the proposed project were those expected.

Cumulative Actions Considered in this Analysis

Past Activities

- The series of timber sales occurring between 1959 and 1969 from Blue Park southwest into the upper reaches of Pauline, Perfecto, and Chavez Creeks.
- Perfecto Creek projects (382 acres) harvested between 1966 and 1969.
- Elk Park Timber Sale of 1973.
- Perfecto Creek Timber Sale (actually near Big Meadows) of 1974.
- Nutras Creek Timber Sale of 1976.
- Salvage logging within the Perfecto Creek project area during the late 1970's.
- Several firewood sales conducted in the diversity unit up until 1986.
- Salvage logging cut in the early 1980's within the diversity unit (336 acres), mostly in the Big Meadows area.
- The 1982 to 1986 Willow-Pinos and Poison Ridge Timber Sales.
- The Chavez Creek Timber Sale, harvested between 1988 and 1990.
- The Big Meadows Timber Sale and the Elk Park Timber Sale harvested between 1993 and 1998.
- In 1998 and 1999, 350 acres of the diversity unit salvage logged for houselogs.
- The 2002 Burro Park Fire (12 acres).

- Past, and ongoing activities within the Cochetopa Grazing Allotment.

- The activities associated with the San Luis, Baldy Chato and Cochetopa Allotments Prior to 1989.

- Activities on the Los Pinos Forage Reserve Allotment.

- Past and on going recreation (hiking, camping , hunting, fishing, firewood gathering).

Possible Future Actions

- Reentry of the 1976 Nutras Creek Timber Sale and the eastern portion of the 1988 Chavez Creek Timber Sale.

- Reentry of units of the 1982 Willow-Pinos Timber Sale.

- Reentry of the 1993 Big Meadows Timber Sale.

- Reentry of the 1983 Poison Ridge Timber Sale in the early 2020's.

- Reentry of the shelterwood units for the proposed Perfecto Creek Timber Sale, about 2030 (20 years out).

- Continued activities within the Cochetopa Grazing Allotment.

- Continued recreation use (hiking, camping , hunting, fishing, firewood gathering).

Comparisons of Alternatives

The following table briefly compares the three alternatives studied in detail as they relate to the project components, objectives (purpose and need), and the issues. A more in-depth discussion of the environmental consequences of each alternative is found in Chapter 3.

Table 1. Comparison of Project Issues, by Alternative

Issue	Alternative 1	Alternative 2	Alternative 3
Forest Health			
Acres improved through silviculture treatment.	0	910	780
Age class diversity will increase.	No	Yes	Yes
Aspen stand succession to conifer dominance will decrease.	No	Yes	Yes
Travel Management			
Provides access to sites in need of treatment.	No	Yes	Yes
Improves safety along forest roads.	Yes	Yes	Yes
Reduces overall road density.	No	Yes	Yes
Reduces resource damage on roads.	No	Yes	Yes
Potential for increased maintenance needs.	No	Yes	Yes
Road closures will be effective.	N/A	Likely	Likely
Wildlife/TES Species			
Potential effect on TES	No	Yes	Yes
Old Growth protected (acres within the project area).	647	320	452
Timber Production			
LRMP goals will be met.	No	Yes	Yes
Public investment from previous treatments will be realized.	No	Yes	Yes
Gap in planned verses offered timber volume will be reduced.	No	Yes	Yes
Suitable timber production lands will be more fully utilized.	No	Yes	Yes

Chapter 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Silviculture

The analysis information in this section (silviculture) of the EA is based on four spatial scales. The first scale is site-specific information. Each site where activity is being considered has been surveyed on-the-ground. Silvicultural diagnoses summarizing site-specific condition have been prepared for each of the forested sites in the project area.

The second level of analysis is the "Perfecto Creek project area". This 3,565-acre unit includes all of the potential harvesting or treatment proposed in this project and is the same area used for wildlife analysis. The Perfecto Creek project area is defined by Perfecto Creek on the north, the wilderness boundary on the west, Nutras Creek and the 1977 RARE II roadless area boundary on the southeast.

The third level of the silvicultural analysis is the "Diversity Unit". This 23,425-acre area is defined by the combined watershed boundaries of the 7th level Hydrological Unit Code (HUC) watersheds where the proposed Perfecto Creek Timber Sale is located. These are the Pauline/Perfecto/Chavez Creek watersheds and the smaller Nutras Creek watershed. Nutras Creek is included since one of the proposed cutting units is in that watershed, and for consideration of past timber harvesting in the area. The diversity unit runs from Stewart Peak on the southwest down to the Forest Boundary at Burro Park in the northeast. The diversity unit is used to consider the cumulative effects of timber harvesting and vegetation change.

The final level of analysis referred to in this section is the "Los Pinos Landscape". In 1998, the "Los Pinos Landscape Assessment" (Haines, 1998) was prepared to consider the cumulative effects of timber harvesting in the Los Pinos and Cochetopa Creek watersheds during the previous forty years. The document also provided information concerning road impacts, watershed, and longer-term management planning. This report does not replace management decisions made in the Forest Plan. It summarizes information about the landscape. The Los Pinos Landscape included 96,061 acres of National Forest System land and 6,896 acres of adjacent Bureau of Land Management land where timber harvesting has occurred. The total landscape covers 103,641 acres (with 684 acres of private land inholdings).

Affected Environment

Vegetation Cover Types

Cover type and wildlife habitat structural stage was classified for the Perfecto Creek project area and the larger diversity unit. That vegetation mapping was based on the Common Vegetation Unit (CVU) database using the 1988 aerial photograph flight. In this analysis, cover type and structural stage were updated for each polygon based on the later 1998 aerial photographs, and site specific knowledge.

Table 1 displays the general cover types found in the Perfecto Creek project area. Some 2,777 acres of the 3,565 acre project area are forested (78%). In the larger 23,425 acre diversity unit, trees are dominant on 14,628 acres (62%).

Table 2. Cover Type Distribution

Dominant Cover Type	Acres in Project area	Percent of Project area	Acres in Diversity Unit	Percent of Diversity Unit
Rock/Bare	32 acres	1%	1,108 acres	5%
Grass/Forb	647 acres	18%	4,492 acres	19%
Willow/Shrub	109 acres	3%	3,197 acres	14%
Aspen			538 acres	2%
Bristlecone Pine			283 acres	1%
Lodgepole Pine			46 acres	<1%
Blue spruce/Douglas-fir			166 acres	1%
Spruce-Aspen Mix	447 acres	13%	5,141 acres	22%
Spruce-fir	2,330 acres	65%	8,454 acres	36%
Total	**3,565 acres**	**100%**	**23,425 acres**	**100%**

There are four general stand conditions for forest vegetation in the Perfecto Creek project area. The first condition is overmature Engelmann spruce in the west half of the area in the higher elevations (1,039 acres). The second character is mature spruce in the east half of the area on a burned area (941 acres). The third character are uneven-aged, mixed Engelmann spruce and aspen stands on the burned area to the east (447 acres). Finally, the fourth character are young one or two-storied spruce stands which became established after 1960's timber harvesting (350 acres).

The spruce-dominated stands of the west half of the project area are nearly pure Engelmann spruce, with some aspen remnants in certain stands. The residual aspen in these stands is in the final stages of decline and very little successful regeneration of aspen is occurring. Few subalpine fir are found in the area. Where spruce stands were not heavily cut over during the 1960's, the spruce is old, overmature, with considerable rot and disease, and in general decline. About half of the spruce stands are even-aged with a one or two-story structure. The other half are two to three-aged, with trees in a clumpy or groupy arrangement, with two to four-stories present. The stand structure depends on

how recent fire has occurred in the stand. The multi-storied stands developed from pre-settlement mosaic burns. Most of the higher elevation spruce stands have not been burned in over 200 years. No large burns have occurred in the analysis area since the 1880's or 1890's, likely due to reduction of grass-forb cover by cattle and sheep grazing and fire control efforts.

The east half of the Perfecto Creek analysis area is forested with mature spruce, or mixed aspen-spruce stands. Again, subalpine fir is uncommon. There are occasional mature, solitary, lodgepole pine individuals found in the area. No young lodgepole pine trees were observed. These stands have developed from pre-settlement mosaic fires. The last of the large fires was more intense than usual. That fire is reported to have occurred in 1883, some 123 years ago. After the 1883 burn, aspen sprouted extensively. Most of the existing aspen in the area are of this cohort, and is nearing the end of the expected physiological life span of aspen. Engelmann spruce survived the burn as individuals, groups of spruce, and as uneven-aged stands. These spruce survivors provided a seed source for a cohort of spruce which is now mature. The establishment of spruce is a continuing process. Open areas are filling in. Spruce is becoming the more dominant tree species as the aspen overstory trees have become overmature, decadent, and are dying out.

Stands harvested in the 1960's using clearcut or heavy partial cut methods are dominated by spruce and fir sapling-sized trees. These young stands are either even-aged/single-storied (206 acres in nine blocks), or two-aged/two-storied (144 acres in six blocks). These older cutting units cover 13% of the forested area of the project area.

Non-forested areas tend to be linear in shape following the topography. Stream bottoms and the adjacent south facing slopes are mostly non-forested.

The general pattern of forest described above continues beyond the Perfecto Creek project area into other parts of the Los Pinos/Cochetopa Creek landscape.

There are no "pure" aspen stands with the project area. All of the aspen is mixed with Engelmann spruce and other conifers. In the 23,425 acre diversity unit, only 538 acres or 2% of the land is covered by what could be considered pure aspen. Aspen does occur in each of the blue spruce/Douglas fir dominated stands and in most of the stands classified as bristlecone pine. The "spruce/aspen mix" classification is used for those stands where aspen makes up 20% to 70% of the species composition in order to describe where aspen is seral to spruce. These seral aspen stands cover 5,141 acres or 22% of the diversity unit.

The 46-acres classified as dominated by lodgepole pine are two plantations where pine was planted. Native lodgepole pine is present at lower elevations of the diversity unit as individual trees or mixed in with the blue spruce/Douglas-fir dominated stands.

Bristlecone pine is found on warm, dry, southerly aspects throughout the Los Pinos and Cochetopa Creek area from the lower tree line to timberline. The sites are generally

rocky and fairly steep. Stunted small diameter aspen are commonly found associated with the bristlecone pine. At lower elevations, Douglas-fir and some blue spruce are mixed in. At higher elevations, Engelmann spruce replaces the Douglas-fir and blue spruce. There are 283 acres in the diversity unit classified as dominantly bristlecone pine.

Stand Structural Stage

Table 3 displays the distribution of wildlife habitat structural stage classes for the project area and the diversity unit.

Table 3. Structural Stage Distribution

Habitat Structural Stage	Acres in Project area	Percent of Project area	Acres in Diversity Unit	Percent of Diversity Unit
Rock/Bare	32 acres	1%	1,108 acres	5%
1M - Grass/Forb	647 acres	18%	4,492 acres	19%
1T – Grass/Forb/Seedling	7 acres	< 1%	11 acres	< 1%
2S – Shrub	109 acres	3%	3,198 acres	14%
2T – Seedling/Shrub			48 acres	< 1%
3A – Sapling/Pole < 40%	124 acres	3%	1,059 acres	5%
3B – Sapling/Pole 40 to 70%	497 acres	14%	2,069 acres	9%
3C – Sapling/Pole > 70%			808 acres	3%
4A – Mature < 40%	270 acres	8%	747 acres	3%
4B – Mature 40 to 70%	981 acres	28%	5,870 acres	25%
4C – Mature > 70%	251 acres	7%	2,070 acres	9%
5 – Old Growth	647 acres	18%	1,945 acres	8%
Total	**3,565 acres**	**100%**	**23,425 acres**	**100%**

Old growth habitat in the area was identified and is included in the mapping. Old growth was identified using aerial photograph interpretation confirmed by field visits, and in addition for the Perfecto Creek project area, score card data. Old growth definition is based on work by Hoover (1984), Mehl (1992), and the Forest Plan.

The 1960's clearcuts and diameter limit cuts have recovered during forty years to the 3B sapling/pole structural stage with crown closures of 40 to 70%.

The wildlife structural stage classification is based on dominant tree size, not on physiological condition. Most of the aspen or mixed aspen stands classified as "sapling/pole" 3A, 3B, or 3C are in truth mature or overmature. Aspen in these stands are about as large as they will be. It is not uncommon for conifers to be over twice as tall as the aspen on these sites. Of the sites in the project area that support forest cover, only 18% are currently not in a mature structural stage. The remaining 82% of the forest sites are in a mature to over mature state. At the diversity unit scale only slightly more (19%) of the forest sites contain smaller (presumably younger) stand structures. This

composition of structural stages in the project area and the diversity area represent a general lack of new tree establishment and early seral forest structure.

Snag and downed wood aspects of stand structure are discussed in the Wildlife section of this report.

Stand Treatment/Timber Production

The preferred management system in this spruce forest is uneven-aged management using group selection. This management system mimics the natural character of the landscape - being three-aged and in a "groupy" arrangement. The natural structural pattern comes from light intensity mosaic fires which under-burned the spruce, then torched out groups of trees of about one chain across on about one-third of the area. The canopy gap then filled-in with seedlings. There is considerable fire evidence in the landscape including fire-killed snags, charcoal, multiple charcoal layers in the soil, burned log and stumps, and fire scarred trees.

Spruce stands at the highest elevations in the landscape have not been burned for a prolonged period (200 years or more). There is much less fire evidence, but it is there. These higher elevation stands are old, overmature, with considerable defect. Stand conditions are poor and declining, stand canopies are often in break-up. In this type of stand, uneven-aged management is not desirable in the short term because the older tree component experiences a high incidence of mortality and slow growth. To implement group selection uneven-aged management immediately, it would be necessary to allow a quarter of the existing overstory to remain on site for up to 120 years (three entries of the 40-year cutting cycles). Stands which have a decadent, overmature overstory do not include trees which can be reasonable expected to survive 120 years and are not conducive for uneven-aged management in the short term. By replacing these stands using even-aged methods including two or three-step shelterwoods, greater net site productivity could be captured and less existing wood volume would be lost to rot, and mortality. With even-aged management cohorts of healthy, young trees could be rapidly established, which could then be more productively converted to an uneven-aged structure in the future.

Timber harvesting in the 1960's pushed stands along the even-aged management pathway with clearcutting or 10-inch diameter limit removal cuts. Fifteen of these 1960's cutting units covering 336 acres are located within the Perfecto Creek project area. Several of these cutting units have an overstory of overmature residual trees which are suppressing sapling growth. Here an option of overstory removal is available to release the desired younger trees. Overstory removal should be accompanied by a cull tree removal of old residual unmerchantable trees to reduce competition and improve the genetic character of the stand. At this time we are not proposing to implement this treatment.

Clearcutting of Engelmann spruce in this area is generally inappropriate from a reforestation prospective. Exceptions are when clearcutting is used to salvage dead or dying trees after bark beetle attack, forest fires, or wind throw events. While clearcutting

has been successfully done here, those clearcuts required expensive tree planting to reforest the site. Regeneration success initially was limited by exposure to wind, desiccation, all day direct sunlight, competition with sedge and grass, and to a degree, damage from livestock grazing. Today on the average, those stands created in the 1960's clearcutting treatments are stocked with 900 trees per acre, 4-inch DBH by 15 feet tall, with trees on 80% of the site. Some of the old clearcuts have up to 3,500 saplings per acre, which is overstocking.

Harvesting trees in groups differs from clearcutting in terms of size of the opening created and the degree of exposure to wind and sunlight. In group cutting, the residual overstory trees surrounding the cut group provide protection from the wind, shading during parts of the day, control of heat at the soil surface and control of moisture conditions. Partial shading is controlled by the size of the group, the slope and aspect of site, height of residual trees, and shape of the group. Seedling growth is less subject to suppression from surrounding trees. Group cuts have been observed to have less grass and sedge cover than clearcuts, thus limiting competition with vegetation. The surrounding residual trees provide the seed source for the new cohort. Group cutting in most stands does follow the natural arrangement of the trees. Groups are typically between one and two tree heights in diameter. In favorable situations, groups can be up to two-acres in size and still provide protection to the site.

Harvesting timber in group cuts is preferred over harvesting trees in uniform patterns. Group cutting accommodates mechanized felling and whole-tree skidding operations.

In the Los Pinos landscape, even-aged spruce stands have been found to reach culmination of mean annual increment (CMAI) at 160 years age. After this age, stands become increasingly over-mature with increasing rates of mortality and decadence. All of the older spruce stands west of FR 794 and FR 794.2B to timberline are beyond CMAI. East of these roads, about half of the spruce stands are beyond CMAI, but stand structures tend to be more three-aged due to disturbance by wild fire.

All of the aspen found in the middle and overstory of stands are overmature and decadent. The aspen component is entirely beyond its CMAI age of 100 years. Most of the aspen is 120 to 150 years old. Aspen stands are seral to Engelmann spruce in this area. Within 20 to 30 years, the aspen component in most of the east end of the proposed timber sale will not be readily evident. Spruce will be the dominant species. Conditions are not conducive to successful reestablishment of aspen where spruce is shading the site (hindering sprouting and suppressing growth due to competition).

To reliably and rapidly (within five-years) obtain spruce regeneration in the project area, the soil will need to be disturbed to provide an adequate mineral soil seed bed. If the soil is not disturbed and the moss cap broken, establishment of sufficient numbers of spruce seedlings will take a prolonged period of time – up to 30-years. Timber harvesting during the summer months usually provides enough soil surface disturbance. However, timber harvesting in the Los Pinos landscape typically is conducted in winter when snow and ice protect the soil from disturbance. Therefore, it is normal operating practice to

conduct machine scarification of seed beds following shelterwood and selection harvesting.

Machine scarification is conducted with a light dozer equipped with a brush rake. The dozer rips the soil, turns on its tracks, and manipulates slash to disturb, but not displace the soil surface. The desired condition is that 40% of the soil surface in harvested areas be disturbed. Scarification does not occur under residual overstory trees or between cut groups (in group selection or group shelterwood). Desirable advance regeneration is easily protected from damage during machine scarification by avoidance. In a group selection where 25% of the stand is cut in groups, with 5% additional cutting in skid trails and landings, scarification of 40% of the harvested area results in actually only about 12% of the gross stand area treated.

Scarification has been conducted on about 4,968 acres of the Los Pinos landscape since 1990. All of the stands treated prior to 2001 have been surveyed and with the exception of four sites, found to be adequately reforested with spruce seedlings (at least 150 or 200 non-cull seedlings per acre depending on site productivity on 75% of the survey plots). This experience in the local landscape shows a 97% success rate for regeneration.

On the Big Meadows Timber Sale, regeneration surveys completed between 2001 and 2004 of 1,205 acres showed an average stocking of 738 non-cull seedlings per acre with 78% of the plots stocked. Big Meadows is adjacent to the Perfecto Creek Timber Sale. Big Meadows Timber Sale included similar treatments on similar sites to those proposed for Perfecto Creek. Similar results have been observed and surveyed on the nearby Elk Park, Still-Elk, and Cathedral Creek Timber Sales.

During the 1960's, clearcutting or 10-inch DBH diameter limit harvesting was conducted extensively in Western Colorado. In the 96,061 acre Los Pinos landscape, there are 111 of these clearcut or heavy cut units covering 3,277 acres. Today, these older clearcuts are dominated by young Engelmann spruce and subalpine fir saplings 4-inch DBH by 15-feet tall, with usually 900 saplings per acre on 80% of the harvested area. Many of the 1960's cutting units were planted with spruce or lodgepole pine seedlings. Many additional seedlings from native seed sources have filled in the cutting units.

Included in the Perfecto Creek analysis area are fifteen of the 1960's clearcuts covering 359 acres. It is recommended that twelve acres (3.6% of the clearcuts) in three areas receive fill-in tree planting with Engelmann spruce to increase stocking. One non-stocked area had been a landing covered by heavy slash which was burned in 1992. The second poorly stocked area is in landings within a clearcut. The third poorly stocked area is adjacent to an upland (dry) park where broadcast burning was used. If the soil is ripped or tilled during machine scarification of the proposed timber sale, adverse soil conditions which resulted from burning, soil compaction, and competing sedge can be corrected. Thus tree planting has a good probability of being successful.

A limited amount of personal-use firewood is gathered each year from the project area. The driving distance from Gunnison or Saguache is the limiting factor for firewood

gathering. Firewood is cut from standing dead adjacent to open roads. The older, gray, down woody debris from previous logging and windthrow is no longer suitable for fuelwood.

All land included in proposed cutting units was found to be suited. Suitability is defined in terms of being available for harvest (not in wilderness), where reforestation is assured, site productivity is above minimal levels, and soil productivity can be maintained.

Insects and Disease

This section describes the forest health situation for the Perfecto Creek project area. Information is derived from field reconnaissance by the Forest Pathologist and the Silviculturist. Reconnaissance by the Forest Pathologist is documented in Service Trip Report GSC-04-07, 2004. The Silviculturist documented his notes in the silvicultural diagnosis.

As with most older and aging forests, trees in the Perfecto Creek area are becoming more vulnerable to mortality from insects, disease and windthrow. Potential forest products are increasingly being lost due to stem rots, mortality, and windthrow with subsequent deterioration. Growth in older trees is slower than younger trees. With increasing losses due to deterioration, mortality, and slowing growth rates, net growth for the area is approaching zero. In some stands, net growth is negative.

The aspen component in the Perfecto Creek area is in poor condition. White truck rot (*Phellinus tremulae*) and a variety of cankers are common. Root disease is also common. It is estimated that up to 75% of aspen stem wood is unmerchantable for sawn lumber due to rot. The high level of incidence of disease is a factor of the age of trees and repeated injuries from big game, weather, and insects.

Armillaria root disease (*Armillaria ostoyae*) is present in the project area. The root disease will reduce growth on trees by impacting the root system function. In large trees, the loss of roots will reduce the trees anchoring to the soil, thus making the tree vulnerable to windthrow. This windthrow vulnerability is evident in the higher spruce stands between Perfecto and Chavez Creek. Those stands are proposed for shelterwood harvest to accelerate the replacement of the overstory with younger trees.

Spruce broom rust (*Chrysomyxa arctostaphyli*) is found through the spruce-fir cover type within the project area. Damage comes from top kill, growth reduction, and the creation of “disease courts” for stem rots. The best management practice for broom rust is to target infected trees for removal during harvest.

Red ring rot (*Phellinus pini*) is common in spruce in the area. The rot causes loss of sawtimber volume through wood deterioration. In the Perfecto Creek project area, it is estimated that between 15% and 20% of the merchantable spruce volume will be lost due to stem rot. In certain stands at higher elevations the amount of defect will be higher. Stem rots also make the tree vulnerable to windthrow or wind breakage.

Spruce ips beetle (*Ips* species) is present, but mostly as a secondary pest in spruce infested with root disease and stem rot. The beetle is not likely a large threat in this area.

In 2005, increasing spruce beetle mortality was found in the headwaters of Chavez Creek and Perfecto Creek. The increased insect activity was likely triggered by the 2002 drought. Most of the mortality observed in 2005 was concentrated in patches of five to ten trees.

One stand was found to have about 30 freshly infested trees per acre. This is the second or third year of increased spruce beetle activity. About 10% of the larger spruce are already dead. The 70-acre stand is not suited for timber production due to steep slopes, rock, wet ground, numerous springs and seeps, and poor access. Salvage and sanitation is not an option on this site. It is likely that spruce beetle mortality will increase in this stand. Spruce beetles could spread out from this center into adjacent spruce stands.

Schmid and Frye (1976) developed a spruce beetle risk rating system which uses the identified preferences. In general, stands of highest risk are in creek bottoms or toeslopes, have basal areas greater than 150 square feet per acre, more than 65% of the trees being spruce, and larger diameter trees (16-inch). The infested stand mentioned above meets these textbook conditions.

Stand examination data collected during the 1980's indicates spruce beetle risk as moderate in most stands within the project area. No high risk stands were identified. This rating is likely conservative. Since the stand exam data was collected, spruce stands have become older and are generally in a declining condition. Stand density has increased in all stands, often exceeding 140 square feet of basal area, and most of the higher elevation spruce stands in the area are nearly pure Engelmann spruce. These are all factors contributing to an increased risk of spruce beetle attack.

Field review in 2005 found several stands which are of high beetle risk rating. The stand in the head of Chavez Creek discussed above is one of those high risk rating stands. Those stands harvested during the 1960's and 1990 Chavez Creek Timber Sale are at low to moderate risk rating today.

Spruce beetle has caused periods of increased mortality in past decades in the Los Pinos area. Between 1983 and 1985, beetle mortality increased in the upper Perfecto Creek, Pauline Creek, and Los Pinos Creek drainages. The spruce beetle mortality occurred in small clumps or as individual trees in the favored sites. Between 5 and 10% of the larger spruce trees were killed across about 10,000 acres. Timber sales following the increased mortality period salvaged dead trees for houselogs and dead sawtimber. The West Pinos Timber Sale currently under contract for harvest includes salvage as one of the removal criteria.

Environmental Consequences

Table 4 below provides a generalized schedule for structural stage recovery after disturbance (harvest, & insects). For individual stands, there are a number of factors which may change the recovery rate. Wildfire can be highly variable in intensity, scale, and site impact so no prediction is made. Similarly, no prediction is made for stand decline and break-up other than for the stands where shelterwood is proposed and where aspen is seral to spruce.

Table 4. Change in Structural Stage After Disturbance

Type of Disturbance	Pre-disturbance Structural Stage	Post-disturbance Structural Stage	Recovery Stage and Time
Group Selection or Individual-tree Selection	5	4B	5 in 20 years
	4C	4B	4C or 5 in 20 years
	4B	4B	4C or 5 in 30 years
Salvage and Sanitation	4B/4C/5	No Change	No Change
Two-step Group Shelterwood	4B	4A	3B in 20 years after FOR 4B/4C in 80 years 5 in 120 years
Natural Break-up of Two-step Group Shelterwood Stand	4B	4B	4A/3C in 20 years
Overstory Removal	4A or 3B	3B	3C in 20 years 4C in 80 years 5 in 120 years
Aspen Rehabilitation	3C or 4C	3A or 4A	3B or 3C in 5 years 4B or 4C in 80 years
Aspen/Spruce Succession (with aspen die off)	POTR/PIEN 4B/4C	PIEN/POTR 4B in 20 years	PIEN 4B/4C in 40 years (POTR inconspicuous)
Spruce Beetle (Light Outbreak)	4B/4C/5	4B in 10 years or less	4C/5 in 40 years
Spruce Beetle (Heavy Outbreak)	4B/4C/5	3B in 10 years or less	4B in 60 years 4C in 80 years 5 in 100 to 120 years

All sites proposed for timber harvest are suited for timber production. None of the proposed harvest units are within areas identified as “roadless”.

Alternative 1 – No Action

Under this alternative, no immediate change in wildlife habitat structural stage will occur due to timber harvesting. An increased amount of mature tree mortality will occur depending on the spread of spruce bark beetle during the next several years that could create more open stand structure or stand replacement under severe outbreak conditions. Because the spread of spruce beetle populations are partially dependent on climatic conditions it is difficult to predict when an outbreak will occur. There is certainty that the abundance of mature spruce forest within the project area provides ample habitat for the growth and spread of a bark beetle outbreak. If such an outbreak were to occur, the impact on stand structure would be dramatic.

Impacts from insect and disease will increase with time as stands become older and less vigorous. Spruce lost through windthrow or stem breakage will increase spruce bark beetle brood habitat, increasing the amount of spruce beetle mortality in standing trees.

Mortality caused by insects and disease will increase the number of standing dead trees and the amount of down woody debris. With the increase in down woody debris, the potential for intense, stand replacing forest fire will be increased.

Unless a natural disturbance event occurs, mixed aspen-spruce stands in the eastern half of the project area will become dominated by Engelmann spruce in 20 to 30 years. Aspen will remain present, but not be readily evident and will continue on a downward decline in many stands. Some stands where aspen is a minimal component at present, will lose more aspen root stock and are likely to lose the aspen component completely within the next 30 years.

No change in spruce dominance is expected in the west half of the project area. Mature stand structures will remain at high levels with no new recruitment of early seral conditions without natural disturbance events. Mature stands will continue to grow older and become more susceptible to disease and insect attacks. Timber productivity will decline as stands continue to age past the point of the culmination of mean annual increment. Trees that are currently diseased will continue to lose growth potential and wood volume as the diseases progress.

No commercial timber harvesting would occur. No wood fiber from this project area would be available to industry and consumers this planning period. Tree mortality would occur at a higher rate than under either of the action alternatives. The past investment in silvicultural treatments and road infrastructure would not be fully captured, and Forest Plan objectives for timber production within the project area would not be accomplished. Age class structure will continue to proceed to a largely mature forest with a lack of younger age class recruitment. The risk of bark beetle attack would be greater than under either of the action alternatives, threatening the capacity of the project area to produce wood volume in the mid and long terms.

There would be no change in the access to or availability of personal-use firewood.

No timber harvesting would be implemented, therefore reforestation work would not be required. The opportunity to increase stocking of twelve acres in old harvest units would be foregone.

Alternative 2 – Proposed Action

Table 5 shows the anticipated change in wildlife structural stage distribution due to timber harvesting of Alternative 2.

Table 5. Structural Stage Distribution After Proposed Timber Harvesting Within The Project area

Habitat Structural Stage	Current and After Alternative 1	Percent	After Alternative 2	Percent	After Alternative 3	Percent
Rock/Bare	32 acres	1%	32 acres	1%	32 acres	1%
1M - Grass/Forb	647 acres	18%	647 acres	18%	647 acres	18%
1T – Grass/Forb/Seedling	7 acres	< 1%	7 acres	< 1%	7 acres	< 1%
2S – Shrub	109 acres	3%	109 acres	3%	109 acres	3%
2T – Seedling/Shrub						
3A – Sapling/Pole < 40%	124 acres	3%	129 acres	3%	145 acres	4%
3B – Sapling/Pole 40 to 70%	497 acres	14%	497 acres	14%	488 acres	14%
3C – Sapling/Pole > 70%						
4A – Mature < 40%	270 acres	8%	324 acres	9%	324 acres	9%
4B – Mature 40 to 70%	981 acres	28%	1,386 acres	39%	1,239 acres	35%
4C – Mature > 70%	251 acres	7%	114 acres	3%	122 acres	3%
5 – Old Growth	647 acres	18%	320 acres	9%	452 acres	13%
Total	**3,565 acres**	**100%**	**3,565 acres**	**100%**	**3,565 acres**	**100%**

The changes listed in Table 5 are based on site-specific consideration. Greater age class diversity will be created within the treated stands, which will enhance the structural diversity in the project area. Decrease in old growth habitat and dense 4C structural stage acres will be temporary, with most stands regaining the pre-harvest structural stage class in 20 to 30 years. The amount of forest with old growth structure will remain within the Forest Plan standards.

About five acres of mixed spruce-aspen will become dominated by aspen following group cutting.

Machine scarification after timber harvesting is expected to prepare the seedbed on 12% of the stand area in group selection units, 15% in the individual-tree selection units, and 20% of the group shelterwood units. No scarification is planned in the salvage and sanitation unit. In total, about 114 actual acres of the proposed 910 acres of harvest treatment would be disturbed during site preparation. Seed bed scarification is also proposed for twelve acres prior to tree planting.

Based on regeneration surveys on the similar sites of the Big Meadows Timber Sale, it is likely that 96% of the harvested acres will be stocked with an average of 738 non cull seedlings per acre on 78% of the plots measured.

Aspen root sprouting will occur on most of the eastern half of the proposed timber sale after harvest.

Tree planting will increase the stocking of twelve acres of poorly stocked 1960's clearcuts.

An estimated 3,258 MBF net volume or 7,267 CCF net volume of spruce sawtimber would be harvested from 910 acres. Table 6 below displays how many acres would be treated by each harvest system.

Table 6. Comparison of Proposed Treatments By Alternative

Treatment	Alternative 2	Alternative 3
Group Selection	747 acres	550 acres
Individual-tree Selection	61 acres	61 acres
2nd Entry 3-step Group Shelterwood	17 acres	17 acres
1st Entry 2-step Group Shelterwood	37 acres	37 acres
Salvage-Sanitation	8 acres	8 acres
Aspen Rehabilitation	40 acres	107 acres
Total Acres of Harvesting	**910 acres**	**780 acres**
Net Harvest Volume in MBF	3,258 MBF	2,589 MBF
Net Harvest Volume in CCF	7,267 CCF	5,776 CCF

The proposed group selection harvesting would remove the oldest and less healthy trees in groups of ¼-acre size (about two tree heights or 130 feet across). Twenty-five percent of the spatial area of each stand would be harvested in groups thereby establishing a cohort of young, vigorous trees on about 180 acres from this treatment. These newly established trees will thrive in the open, yet sheltered environment provided by the quarter acre openings, and capture more of the net site productivity. This will increase the overall timber production rate of the treated stands in the long term. A cutting cycle of forty years would be implemented. During future harvest entries, similar cohorts of tree regeneration will be established until the cohort created with this entry is 160 years old and ready for the next cycle of removal. Under this silvicultural regime, a variety of age and size classes are created and maintained within each stand - all growing at a near optimal rate. The final harvest at 160 years of age is at about the point of maximum average annual growth rates (CMAI) for the spruce/fir stands in the project area, and net wood volume production will be near maximum levels. These expected growth rates are well above those produced in the existing unregulated, mature and over-mature stands. Healthy, faster growing stands will be less susceptible to insect and disease attacks, which will have positive effects to the economic and stand health environment.

The 40-acre aspen rehabilitation treatment will benefit aspen trees on the site. The spruce will be removed to create openings favorable for aspen survival and growth.

Individual-tree selection is proposed for two stands located on south facing slopes. The general prescription is to harvest trees uniformly or in small clumps of less than 33 feet across. The least healthy trees would be targeted for removal. The stand density following harvest would be between 80 and 100 square feet basal area over 5" DBH. Tree regeneration will occur in openings created by this treatment providing growing stock recruitment, improving stand health and increasing stand level net growth rates. The effects of this treatment are generally the same as those described above for the group selection treatment. Notable differences include a slightly higher level of competition due to the smaller openings created with the individual tree selection treatment and age classes are distributed more evenly throughout the stand. This treatment also allows a more effective removal of trees with poor genetics, diseases, or insect attack because harvesting occurs uniformly throughout the stand during each entry.

One stand, a 17-acre patch south of Chavez Creek is in a poor condition and would not be managed using group selection during this entry. The stand was previously harvested with the first entry of a three-step group shelterwood in 1990. The harvested areas have abundant spruce and fir regeneration at rates of 1,500 to 6,000 one-foot tall seedlings per acre. It is proposed that the second entry of the three-step group shelterwood be implemented, removing 40 to 45% of the remaining overstory in groups of ¼-acre size. The treatment would be done at approximately the twentieth year since the previous harvest (2010).

On 37-acres in the upper part of the Perfecto Creek area, a Two-step Group Shelterwood is proposed. The spruce stand there is in very poor condition with a third of the overstory already dead and down. In a sense, nature has already conducted the first-entry of removal. The proposed treatment is to remove 40 to 45% of the overstory in groups during this entry, then remove the remaining overstory in twenty years (about 2030).

Both of the shelterwood treatments will accelerate the establishment of a younger, even-aged stand. This will have the effect of increasing net wood production rates in the mid and long term, and salvaging the rapidly declining wood volume currently on site.

In an eight-acre stand where regeneration harvesting is not appropriate for this entry, salvage and sanitation harvesting would be used to remove dead and declining trees. The treatment would improve stand health and to a small degree reduce competition between the remaining trees. Salvage and sanitation would be used to delay even-aged treatments. The treatment is a holding action. Note that in other stands, previous salvage, sanitation, or commercial thinning has improved stand health sufficiently to make uneven-aged management feasible.

Some additional firewood would be available for the public or commercial firewood cutters immediately after timber harvesting. However, when the road closure work is completed, access for firewood cutting would be limited to only the roadsides of FR 794

and FR 794.1B. This will be only a minor impact since little firewood is cut in the area now.

During timber harvest, the least healthy, most damaged, and most vulnerable trees are targeted for removal where possible. Their removal will directly reduce the incidence of disease and insects, reduce the amount of insect and disease habitat available, reduce (to a limited degree in group selection) competition between residual trees, and provide for developing a cohort of young, fast growing, healthier, more insect and disease resistant trees. Improvement in stand health will occur on 910 acres of spruce in the Perfecto Creek area through group selection, individual-tree selection, and salvage-sanitation harvesting.

Management caused spruce and Ips beetle activity increases are not expected to occur as a result of stand treatments. Schmid (1977) provided a number of recommendations for treating logging slash to minimize beetle habitat. The practice of yarding unmerchantable green logs (YUM) over eight-inches in diameter and eight-feet long to landing for pile burning is commonly used in the spruce-fir type. In addition, current logging practices include mechanized delimbing, which peels a portion of the green bark off of logs, reducing potential beetle habitat. Recommendations for reducing beetle habitat by cutting stumps below 18-inches height is accomplished since timber sale contracts require maximum stump of 12-inches or less, and with mechanized felling, stumps are commonly only three to four-inches high. Finally, limbing of tops and logs is required in the timber sale contract and accomplished through mechanized means.

Stands which are not harvested will continue to suffer mortality or loss of potential volume as described in Alternative 1, No Action.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement

Table 5 above shows the anticipated change in wildlife structural stage distribution due to timber harvesting in Alternative 3. The changes are based on site-specific consideration. Greater age class diversity will be created within the treated stands, which will enhance the structural diversity in the project area. Only half of the change to old growth habitat occurs in Alternative 3 – Old Growth Retention -- as compared to Alternative 2. Decrease in old growth habitat and dense 4C structural stage acres will be temporary, with most stands regaining the pre-harvest structural stage class in 20 to 30 years.

An estimated 2,589 MBF net volume or 5,776 CCF net volume of spruce sawtimber would be harvested from 780 acres. Table 6 above displays how many acres would be treated by each harvest system. Harvesting would take place on 28% of the forested area of the Perfecto Creek project.

Group selection would be conducted as described in Alternative 2, but to a lesser extent. In Alternative 3, 550 acres would be treated with group selection in six blocks.

About 21 acres of mixed spruce-aspen will become dominated by aspen following group cutting.

The same individual-tree selection, shelterwood, and salvage-sanitation treatments are proposed in both Alternative 2 and 3. The effects of these treatments are not repeated here, but can be found by referring to the discussion presented for Alternative 2 above.

In addition to the 40-acre stand aspen treatment described for Alternative 2, two additional stands (107 acres total) would be treated to favor aspen by removing the conifer component in this alternative. The sivicultural effects are the same as those reported in the Alternative 2 discussion above.

Some additional firewood would be available for the public or commercial firewood cutters immediately after timber harvesting. However, when the road closure work is completed, access for firewood cutting would be limited to only the roadsides of FR 794 and FR 794.1B. This will be only a minor impact since little firewood is cut in the area now.

Machine scarification after timber harvesting is expected to prepare the seedbed on 12% of the stand area in group selection units, 15% in the individual-tree selection units, and 20% of the group shelterwood units. No scarification is planned in the salvage and sanitation unit. In total, about 90 actual acres of the proposed 780 acres of harvest treatment would be disturbed during site preparation. Seed bed scarification is also proposed for twelve acres prior to tree planting.

Based on regeneration surveys on the similar sites of the Big Meadows Timber Sale, it is likely that 96% of the harvested acres will be stocked with an average of 738 non-cull seedlings per acre.

Aspen root sprouting will occur on most of the eastern half of the proposed timber sale after harvest.

Tree planting will increase the stocking of twelve acres of poorly stocked 1960's clearcuts.

The effect of timber harvesting will be similar that described in Alternative 2. There will be fewer acres of spruce harvest, and the stands where the opportunity to harvest is foregone will be affected by insects and disease as described in Alternative 1, No Action. Stand health will be improved on 780 acres of group selection, individual-tree selection, and salvage-sanitation harvesting.

The 54-acres of shelterwood harvest will accelerate the replacement of unhealthy and declining spruce overstory trees with thrifty spruce and fir regeneration. These stands currently have higher amounts of windthrow loss, and volume loss due to stem rot.

Cumulative Effects

Under both action alternatives the cumulative impact in regard to silviculture will be largely positive. Past silvicultural treatments have successfully accomplished the goals they were designed for. Site productivity has not been diminished through soil loss, or deforestation as a result of any past management activities. The haul road system does not have extensive problems and would be improved as a result of implementing either action alternative. Managed timber sites continue to grow wood volume at expected growth rates, and the area continues to support multiple uses such as wildlife habitat, recreation and livestock production at acceptable levels.

Past Timber Harvest History

Some timber harvest is likely to have occurred in connection with the construction and maintenance of the West Fork Ranger Station and Big Meadows Ranger Station. The West Fork Ranger Station was located on Pauline Creek south of Burro Park. The Big Meadows Ranger Station was in Big Meadows. Trees were cut for posts and poles during the late 1800's and early 1900's for fencing allotments and pastures.

The earliest recorded timber harvesting in the diversity unit was between 1929 and 1933 by E. B. Noland near Burro Park (four acres within the diversity unit).

Large scale timber harvesting in the diversity unit began 47 years ago in 1959. The series of timber sales between 1959 and 1969 generally worked from Blue Park southwest into the upper reaches of Pauline, Perfecto, and Chavez Creeks as the road system was constructed or reconstructed. Harvest methods included clearcutting and 10-inch diameter limit cuts. The diameter limit cuts were either overstory removals or shelterwood seed cuts. There are 49 blocks of harvesting covering 1,230 acres within the diversity unit from this period. The common practice was to layout these harvest units as squares or rectangular shapes. An additional 320 acres were salvage logged or shelterwood seed cut during this period. Logging has continued intermittently in the project area up until the 1990s. Table 7 summarizes the harvesting which has occurred by decade.

All of the 1960's cuts were first entry (1,550 acres). During the 1970's, first entry harvests occurred on 2,241 of the 2,338 acres cut (96%). During the 1980's, first entry harvest occurred on 1,427 of the 1,740 acres cut (82%). During the 1990's, first entry harvest occurred on 336 of the 2,712 acres cut (12%).

Of the 8,976 acres of suited and roaded timber land within the diversity unit, 5,554 acres (62%) have been harvested at least once. In the Perfecto Creek project area 858 acres of 2,178 acres (39%) of suited and roaded area have been previously harvested. The recent harvest entries have used modern environmental protection practices during implementation and detrimental impacts have been greatly reduced as a result. All treatment sites (except 19 acres [0.6%] from the 1960's era) have regenerated to forest cover and are functioning as expected for the various seral stages and stand structures existing within the landscape.

Table 7. Summary of Harvest Treatments By Decade

Decade	Type of Harvest	Perfecto Creek Project area	% of Forested (2,777 acres)	Diversity Unit	% of Forested (14,628 acres)
1929	Individual-tree Selection			4 acres	< 1%
1960's	Clearcut	74 acres	3%	286 acres	2%
	Overstory Removal	184 acres	7%	914 acres	6%
	Seed Cut	112 acres	4%	338 acres	2%
	Salvage	12 acres	< 1%	12 acres	< 1%
	Total =	**382 acres**	**14%**	**1,550 acres**	**10%**
1970's	Seed Cut			12 acres	< 1%
	Preparatory Cut			1,703 acres	12%
	Salvage	190 acres	7%	804 acres*	5%
	Total =	**190 acres**	**7%**	**2,338 acres***	**16%**
1980's	Overstory Removal	112 acres	4%	137 acres	1%
	Seed Cut			421 acres	3%
	Preparatory Cut	154 acres	6%	752 acres	5%
	Salvage/Sanitation	152 acres	5%	488 acres**	3%
	Total =	**418 acres**	**15%**	**1,740 acres****	**12%**
1990's	Group Selection			720 acres	5%
	Individual-tree Selection			1,322 acres	9%
	Overstory Removal			209 acres	1%
	Seed Cut			45 acres	< 1%
	Preparatory Cut			245 acres	2%
	Salvage/Sanitation			350 acres***	2%
	Total =			**2,712 acres*****	**19%**
	One Harvest Entry	726 acres	26%	2,785 acres	19%
	Two Harvest Entries	132 acres	5%	2,334 acres	16%
	Three Harvest Entries			435 acres	3%
	Total Acres Harvested	**858 acres**	**31%**	**5,554 acres**	**38%**

*181 acres of salvage were conducted in stands previously preparatory cut in the 1970's.
**58 acres of salvage were conducted in stands previously preparatory cut in the 1980's.
***179 acres of salvage were conducted in stands previously preparatory or group selection cut during the 1990's.

Proposed Perfecto Creek Timber Sale

In Table 8, summary information of past timber harvest entries are compared to, and accumulated with, the two timber harvest alternatives of the proposed Perfecto Creek Timber Sale.

Table 8. Cumulative Timber Harvest Acres by Alternative

Decade	Type of Harvest	Perfecto Creek Project area	% of Forested (2,777 acres)	Diversity Unit	% of Forested (14,628 acres)
2000's	**Perfecto Creek Alternative 2**				
	Group Selection	747 acres	27%	747 acres	5%
	Individual-tree Selection	61 acres	2%	61 acres	< 1%
	Seed Cut	54 acres	2%	54 acres	< 1%
	Salvage/Sanitation	8 acres	< 1%	8 acres	< 1%
	Aspen Rehabilitation	40 acres	1%	40 acres	< 1%
	Total =	**910 acres**	**32%**	**910 acres**	**6%**
	One Harvest Entry	745 acres	27%	2,804 acres	19%
	Two Harvest Entries	552 acres	20%	2,754 acres	19%
	Three Harvest Entries	17 acres	1%	452 acres	3%
	Total Acres Harvested	**1,314 acres**	**48%**	**6,010 acres**	**41%**
2000's	**Perfecto Creek Alternative 3**				
	Group Selection	550 acres	20%	550 acres	4%
	Individual-tree Selection	61 acres	2%	61 acres	< 1%
	Seed Cut	54 acres	2%	54 acres	< 1%
	Salvage/Sanitation	8 acres	< 1%	8 acres	< 1%
	Aspen Rehabilitation	107 acres	4%	107 acres	1%
	Total =	**780 acres**	**28%**	**780 acres**	**5%**
	One Harvest Entry	697 acres	25%	2,756 acres	19%
	Two Harvest Entries	511 acres	18%	2,713 acres	19%
	Three Harvest Entries	17 acres	1%	452 acres	3%
	Total Acres Harvested	**1,225 acres**	**44%**	**5,921 acres**	**41%**

Alternative 2 of the proposed Perfecto Creek Timber Sale is the harvest of 910 acres, of which 456 acres would be first-entry. Alternative 2 would increase the number of harvested acres within the diversity unit to 6,010 acres (67% suited and roaded). At the Perfecto Creek project area level, the harvested area would become 1,314 acres (60% of the suited and roaded).

Alternative 3 of the proposed Perfecto Creek Timber Sale is the harvest of 780 acres, of which 367 acres would be first-entry. Alternative 3 would increase the number of harvested acres within the diversity unit to 5,921 acres (66% suited and roaded). At the Perfecto Creek project area level, the harvested area would become 1,225 acres (56% of the suited and roaded).

Probable Future Activities

It is unlikely that any unroaded areas within the diversity unit will be entered for timber harvest within the foreseeable future. Upcoming timber harvests will likely be concentrated in areas previously logged or in stands which are reasonably accessible from existing roads (open or closed). All future harvest entries will be designed to minimize negative impacts, and practices will continue to improve through the use of adaptive management.

The most likely new timber sale proposal in the diversity unit would be a reentry of the 1976 Nutras Creek Timber Sale and the eastern portion of the 1988 Chavez Creek Timber Sale. Some 400 to 450 acres could be potentially harvested during the 2010's.

The next potential timber sale could occur late in the 2010's or early 2020's as a reentry of units of the 1982 Willow-Pinos Timber Sale. An estimated 950 to 1,000 acres could potentially be harvested.

Finally, some 210 to 400 acres in and south of the 1983 Poison Ridge Timber Sale could be reentered in the early 2020's. Uneven-aged management would continue to be implemented there.

For the proposed Perfecto Creek Timber Sale, reentry of the shelterwood units would be scheduled about 2030 (20 years out). The selection harvest units would be due for reentry about 2050 (40 years out).

Wildlife

Affected Environment

The Perfecto Creek Timber Sale project area comprises 3,565 acres located in the Perfecto Creek, Chavez Creek, and Nutras Creek drainages in northwest Saquache County. The project area is located within the Pauline Creek watershed approximately 34 miles south of Gunnison, Colorado in Township 44 N., Range 1 E., Sections 10, 11, 14-17, 20-22, 27 & 28, New Mexico Principal Meridian. A larger analysis area was utilized for an analysis of project effects on wildlife, comprising 6,870 acres. This analysis area was defined by seventh and eight level watersheds and subwatersheds within the Forest boundary outside the La Garita Wilderness that include the above drainages. A second larger analysis area, the Pauline Creek and Nutras Creek watersheds (7^{th} level), was used for the cumulative effects analysis, but cumulative effects analysis varied by species. All the above drainages and their tributaries drain into Cochetopa Creek to the east, which drains into Tomichi Creek just south and east of Gunnison. Tomichi Creek drains into the main stem of the Gunnison River.

The 6,870 acre analysis area contains diverse plant communities ranging from grass-forb communities with shrubby cinquefoil found within large open parklands, high elevation riparian areas consisting of willow vegetation, and aspen inclusions that occur along forest edges adjacent to willow riparian areas. Aspen stands extend into higher elevation conifer habitat dominated by Engelmann spruce-subalpine fir. The forested portion of the Perfecto analysis area is primarily spruce-fir (Engelmann spruce is prevalent, subalpine fir is uncommon), with lesser amounts of aspen and lodgepole pine. Elevations range from 10,240 feet near the confluence of Perfecto and Chavez Creeks to 12,080 feet at a high ridge on the southwest boundary of the analysis area, which abuts the La Garita Wilderness.

The diversity of habitats within the analysis area supports a variety of wildlife species. Big game animals include deer, elk, and moose. Common small mammals include red squirrels, snowshoe hare, chipmunks, voles, deer mice, and bushy-tailed woodrats. Carnivores include coyote, American marten, mountain lion, bobcat, Canada lynx, weasels, and black bear. A large variety of bird species use habitats within the analysis area including songbirds, woodpeckers, blue grouse, waterfowl, and raptors.

Wildlife and habitat surveys consisting of northern goshawk (broadcast calling; Kennedy and Stahlecker 1993, Kimmel and Yahner 1990), threatened and endangered species (verification of lynx habitat; Grand Mesa, Uncompahgre and Gunnison National Forest 2001), Sensitive species, Neotropical migrant point-count bird surveys (Huff et al. 2000), snow tracking, track plate and camera stations for forest carnivores (Zielinski and Kucera 1995), snag and down wood (Bate et al. 1999, 2000), and amphibian surveys were conducted during eight field seasons from 1994 to 2005 (no surveys were conducted in 1996 – 1998, 2001). Species with documented occurrences or suitable habitat within the analysis area are presented below in tables 9, 10, 11, and 12, and survey results are

discussed further where they are applicable to a particular species under our analysis of effects.

Snags and downed wood are an important habitat component for many wildlife species in terms of their value for nesting, denning, resting, foraging and cover. Species such as lynx and marten depend on course woody debris to meet their reproductive life history requirements in terms of den sites and thermal cover for young. Woodpeckers, such as the three-toed woodpecker, depend heavily on snags for cavity excavation and foraging. Secondary cavity nesters, such as the boreal owl, utilize snags with cavities created by woodpeckers. Course woody debris provides micro sites and cover for many small mammals such as mice, voles, shrews, and snowshoe hare that are also prey species for forest carnivores.

Snag and down wood inventories were conducted in the Perfecto analysis area during the fall seasons of 2002 and 2003, utilizing methods developed by Bate et al. (1999, 2000). The objective was to determine if estimated snag and log densities met, or exceeded, targeted densities listed in the Amended Land and Resource Management Plan for the GMUG National Forests (1991). In addition, a distribution index was applied to determine if snags were distributed evenly enough across the landscape to meet the habitat needs of territorial cavity nesters. We inventoried snags and logs by line transect sampling in two different forest types based on past timber harvest activities.

Our total sample size represented the forested portion of the Perfecto analysis area. A total of twenty-six 200 meter-long snag transects and thirty-three 100 meter-long log transects were implemented across the landscape within the analysis area. Standards and guidelines listed in the Amended Land and Resource Management Plan for the Grand Mesa, Uncompahgre and Gunnison National Forests require 50 linear feet per acre of logs with a minimum diameter of 12 inches for spruce-fir, Douglas fir, and ponderosa pine, and a 10 inch diameter for aspen and lodgepole pine; and a minimum of 3 – 5 snags per acre with at least a 10 inch diameter at breast height, and a minimum height of six feet. Survey results estimated total log abundance at 105 linear feet per acre comprised of 32 logs per acre (77 ft/ac and 24 logs/ac in stands with little or no past harvesting; and 314 ft/ac and 97 logs/ac in harvested stands). Snag density was estimated at 9.8 snags per acre (10 snags/ac in stands with little or no past harvesting; and 7.5 snags/ac in harvested stands). The snag distribution index was 1.69 (1.68 in stands with little or no harvesting; and 1.78 in harvested stands), which suggests an even snag distribution across the landscape that meets the habitat needs of territorial cavity nesters within the Perfecto analysis area (A distribution index of less than 1.0 suggests an uneven distribution, which indicates that there are large areas with few or no snags present).

The distribution and density of snags and logs within the Perfecto analysis area currently exceeds Forest Plan standards and guidelines. When compared to stands with little or no harvesting, harvested stands contained high horizontal diversity in terms of downed logs, but less vertical diversity in terms of snag abundance. This is likely attributed to the creation of logs and debris piles and a reduction in snag recruitment resulting from timber harvest. Timber harvesting has been shown to reduce insect and disease outbreaks,

which has an impact on snag recruitment (Duncan 2002, Watt and Caceres 1999). In contrast, stands with little or no harvesting contained lower horizontal diversity then harvested stands, but greater vertical diversity. Importantly, snag and log distribution and abundance, in addition to tree density and forest canopy cover, will be one of the main factors influencing wildlife use of these stands after timber harvest. Most silvicultural activities will reduce cover of standing trees to some degree, but may increase coarse woody debris in the form of downed logs or standing snags (Smith 2000). Coarse woody debris is recognized as a valuable component of healthy functioning ecosystems (Harmon et al. 1986, Smith 2000), and is essential to meet the habitat requirements for many wildlife species.

Habitat quality for different animal species is based on a combination of many different factors, which is characteristic of the inherent variability, complexity, and uncertainty associated with ecosystems. Most notably, wildlife habitat quality is based on vegetative composition and structure (Thomas et al. 1979). The structure and composition of the forest affects food availability and cover (Smith 2000); in turn the availability of food and cover is affected by changing landscape patterns. Species may respond to landscape patterns in different ways depending on their habitat needs (Gergel and Turner 2002). Natural processes, such as fire, forest insect and disease outbreaks, and wind, in conjunction with management activities all contribute to changing landscape patterns and all create vegetational mosaics. These mosaics create habitat heterogeneity, or discontinuity, across a landscape which is important for maintaining faunal diversity (Smith 2000). Although some discontinuity is generally positive, at some level (which is different for each species), heterogeneity becomes habitat fragmentation (Smith 2000). Importantly, management actions that manipulate land cover, including timber harvest, may have contrasting effects on different wildlife species because habitat improvements for some species may lead to a decrease in habitat quality for others (Smith 2000, Gergel and Turner 2002). These issues are addressed in this section of the Perfecto Creek Environmental Assessment for Threatened, Endangered, Candidate, Sensitive, Management Indicator, and other species of concern documented within or with habitat present in the Perfecto analysis area. In addition, the effects of the Perfecto Creek Timber Sale on wildlife habitat are anticipated and recognized, with design criteria developed to minimize the effects of timber harvesting on habitat quality.

Threatened, Endangered, and Candidate Species

The US Fish and Wildlife Service maintains a list of federally designated Threatened, Endangered, and Candidate species that may occur or be affected by activities occurring in Colorado. The Perfecto analysis area is located within Saguache County in southwest Colorado. Federally listed species within Saguache and adjacent counties are listed in Table 9 and have been considered for habitat suitability and presence within the analysis area.

Table 9. Federally Listed and Candidate Species known or suspected to occur on the Forest, their habitat requirements, and their potential for occurrence within the Perfecto analysis area. Derived from a species list of federally listed and candidate species for the state of Colorado, USFWS, available: http://ecos.fws.gov/tess_public/StateListingAndOccurrence.do?state=CO and http://ecos.fws.gov/tess_public/StateListing.do?status=candidate&state=CO Accessed 02/07/2007.

Species	Habitat	Potential for habitat/species occurrence
Bald Eagle (threatened)	Usually found below 8,000 ft, although they utilize suitable habitat above 8,000 ft in the Gunnison Basin. Reservoirs and rivers. Occurs along the East, Taylor, and Gunnison Rivers during winter. Also uses semi-deserts, grasslands near prairie dog colonies and big game winter ranges.	**No** suitable habitat, no potential for occurrence.
Canada Lynx (threatened)	Early successional spruce/fir and lodgepole pine forests used for foraging, mature and old growth spruce/fir and lodgepole pine containing abundant course woody debris used for denning. Willow riparian areas, mixed aspen/conifer and mature spruce-fir forests are also used for foraging and traveling.	**Potential for occurrence**, project area occurs in denning, winter foraging, and other lynx habitat.
Mexican Spotted Owl (threatened)	Below 9,100 ft. Large steep canyons with exposed cliffs and dense old growth mixed coniferous forests dominated by Douglas fir and/or white fir, or canyons in pinyon-juniper areas with small and widely scattered patches of old Douglas fir. Summer roost sites are in cool microclimates, generally with a closed canopy and/or on north facing slopes. Nest sites in Colorado are typically in caves or crevices on steep cliff faces.	**No** suitable habitat, no potential for occurrence.
Uncompahgre Fritillary Butterfly (endangered)	Above 12,000 ft. Snow willow patches ¼ acre or larger on north, northeast, east, and southeast aspects, often below a melting snowdrift.	**No** suitable habitat, no potential for occurrence.
4 Native Colorado River Fishes (endangered)	Bonytail, Humpback Chub, Colorado Pikeminnow, and Razorback sucker. Aquatic habitats (Rivers, streams, beaver ponds-Colorado River System)	Not addressed in this section; refer to fisheries specialist report. (Project does not involve water depletion.)
Yellow-billed Cuckoo (candidate)	Open woodland, especially with dense undergrowth, parks, riparian woodland and thickets.	**No** suitable habitat, no potential for occurrence.

Federally listed species that may use habitats within the Perfecto analysis area include the Canada lynx (Threatened). The Canada lynx is a rare and elusive forest carnivore that uses large remote interior tracts of montane and subalpine coniferous forest (generally ranging in elevation from 8,000 ft to timberline) with little or no human intrusion.

The lynx is a specialized predator of snowshoe hares but also eats red squirrels, ground squirrels, blue grouse, deer mice, voles, marmots, and ptarmigan, particularly when snowshoe hare abundance is low. Even in periods of snowshoe hare scarcity, the hare still provides the highest percentage of biomass of the lynx diet with low percentages of biomass provided by these other species (Ruggiero et al. 1994; Ruediger et al. 2000). Areas of early successional vegetation with tree seedlings and shrubs provide habitat for snowshoe hare, thus these areas are important to lynx for foraging. Lynx use mature forest stands with abundant course woody debris for denning, travel corridors, and thermal and protective cover for young. Lynx are mostly solitary and have large home ranges (commonly 6 – 8 mi^2, but vary from 5 – 94 mi^2).

The Colorado Division of Wildlife (CDOW) is conducting an ongoing project to reintroduce lynx into Colorado and monitor their movements, survival, and reproduction. On February 3, 1999, the CDOW released 51 lynx in an attempt to reintroduce wild lynx back into the state of Colorado. Lynx were released in the San Juan Mountains near Creede, Colorado, approximately 15 miles south of the proposed Perfecto Creek Timber Sale. Additional lynx were released in the spring of 2000, 2003, 2004, 2005, and 2006. A total of 218 lynx have been released in Colorado as part of this reintroduction effort. Most of the lynx released remain in the core research area in southwest Colorado (New Mexico north to Gunnison, west as far as Taylor Mesa and east to Monarch Pass), with

some movement of lynx in Colorado north of I-70 and into New Mexico, Arizona, Utah, Nevada, Wyoming, Montana, Idaho, Nebraska, Kansas and South Dakota (Shenk 2006).

As of June 30, 2006, CDOW researchers were tracking 95 out of 138 lynx that are still possibly alive (Shenk 2006). In spring 2006, 42 females were being monitored. Four dens were found with a total of 11 kittens (Shenk 2006). Since 2003, a total of 37 dens were found with a mean of three kittens per den (Shenk 2006). Through radio-telemetry CDOW researchers have confirmed lynx presence and dispersal on the Grand Mesa, Uncompahgre and Gunnison National Forests. From February 4, 1999 through February 1, 2005, 121 individual lynx were located within the Grand Mesa, Uncompahgre and Gunnison National Forests (Shenk 2005). With reproduction confirmed and concentrated lynx activity documented in some areas of the Forest, there are likely resident lynx present on the Gunnison Ranger District. The CDOW will not release any lynx in 2007 (Shenk 2006). The CDOW is continuing monitoring efforts to document population viability in terms of whether or not Colorado can support sufficient recruitment to offset annual mortality for a viable lynx population over time (Shenk 2006).

The Perfecto analysis area, which contains potential habitat for the Canada lynx, is located within the Stewart Creek Lynx Analysis Unit (LAU). Additional information on this species habitat needs and a complete analysis of effects can be found in the Biological Assessment for the Perfecto Creek Timber Sale, completed January 10, 2006.

Sensitive Species

Sensitive Species are identified by the USFS Regional Forester as "those…species for which population viability is a concern, as evidenced by…significant current or predicted downward trends in population numbers or density…" or "significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution" (FSM 2670.5; USDA Forest Service 1995). Sensitive Species listed by the USFS Rocky Mountain Region that occur on the Grand Mesa, Uncompahgre and Gunnison National Forests are listed below in Table 10. These species were considered for habitat suitability and potential for occurrence in the Perfecto analysis area.

Table 10. Sensitive Species known or suspected to occur on the GMUG National Forests, their habitat requirements, and their potential for occurrence in the Perfecto Creek Timber Sale analysis area.

Species	Habitat	Potential for habitat/occurrence
AMPHIBIANS		
northern leopard frog *Rana pipiens*	Ponds, lakes, marshes.	Suitable habitat **potentially** exists within the project area[1]
boreal toad *Bufo boreas boreas*	Breeds in shallow, permanent water bodies above 8000 feet; adults use surrounding upland habitats.	Suitable habitat **potentially** exists within the project area
MAMMALS		
American marten *Martes americana*	Old growth spruce & lodgepole pine forests with abundant dead and downed trees.	Suitable habitat **potentially** exists within the project area
fringed myotis	Desert, grass, woodlands, spruce/fir from	**No** suitable habitat, no

Myotis thysanodes	3500-8500ft. caves, abandoned mines & buildings	potential for occurrence[2]
Gunnison's prairie dog *Cynomys gunnisoni*	High mountain valleys & plateaus, grasslands	**No** suitable habitat, no potential for occurrence
kit fox *Vulpes macrotis*	Semi-desert shrublands and pinyon-juniper	**No** suitable habitat, no potential for occurrence
wolverine *Gulo gulo luscus*	Dense mixed forest, tundra.	Suitable habitat **potentially** exists within the project area
pygmy shrew *Sorex hoyi montanus*	Wetlands/riparian. Forest meadow transition areas.	Suitable habitat **potentially** exists within the project area
river otter *Lontra canadensis*	Riparian systems w/ 10cfs permanent water & abundant food base of fish & crustaceans	**No** suitable habitat, no potential for occurrence
spotted bat *Euderma maculatum*	Rough, arid, desert terrain. Variety of scrub and forest habitats. Mines, caves, buildings, rock fissures. 6,000-8,000 feet.	**No** suitable habitat, no potential for occurrence
Townsend's big-eared bat *Plecotus townsendii*	Shrublands, pinyon-juniper woodlands, open montane forests, caves, & mines. 6,000-8,000 feet.	**No** suitable habitat, no potential for occurrence
white-tailed prairie dog *Cynomys leucurus*	Lower elevation valleys & plateaus, grasslands	**No** suitable habitat, no potential for occurrence
BIRDS		
American bittern *Gotaurus lentiginosus*	Cattail marshes or wetlands, tall emergent vegetation, adjacent wet meadows. 9,300 feet.	**No** suitable habitat, no potential for occurrence
black swift *Cypseloides niger*	Waterfalls, cliffs.	**No** suitable habitat, no potential for occurrence
black tern *Chilidonias niger*	Lakes, marshes.	**No** suitable habitat, no potential for occurrence
boreal owl *Aegolius funereus*	Mature – old growth spruce-fir, lodgepole pine, aspen. Above 2,804 meters (9,200 feet).	Suitable habitat **potentially** exists within the project area
Brewer's sparrow *Spizella breweri*	Sagebrush, pinyon-juniper/sagebrush	Suitable habitat **potentially** exists within the project area
ferruginous hawk *Buteo regalis*	Plains, grasslands.	**No** suitable habitat, no potential for occurrence
flammulated owl *Otus flammeolus*	Old growth and mature coniferous forests (ponderosa pine, Douglas fir), mixed conifer, aspen, pinyon-juniper. Elevation of 6,000-10,000 ft.	**No** suitable habitat, no potential for occurrence
grasshopper sparrow *Ammodramous savannarum*	Grasslands w/scattered shrubs, prairies	**No** suitable habitat, no potential for occurrence
Gunnison Sage-Grouse *Centrocercus minimus*	Big sagebrush (*Artemisia tridentata spp*.) and associated riparian habitats.	**No** suitable habitat; project area does not occur w/in the range of this species
Lewis' woodpecker	Lowland and foothill riparian forests &	**No** suitable habitat, no

Melanerpes lewis	agricultural areas, urban areas w/ tall deciduous trees. Prefers understory of grasses for insects.	potential for occurrence
long-billed curlew *Numenius americanus*	Riparian, short-grass meadows. Below 1,524 meters (5,000 feet).	**No** suitable habitat, no potential for occurrence
loggerhead shrike *Lanius ludovicianus*	Plains, low valleys, shrub lands.	**No** suitable habitat, no potential for occurrence
northern goshawk *Accipiter gentiles*	Aspen, mature conifer. Remote areas.	Suitable habitat **potentially** exists within the project area
northern harrier *Circus cyaneus*	Grasslands, pastures	**No** suitable habitat, no potential for occurrence
American three-toed woodpecker *Picoides tridactylus*	Spruce-fir. 2,438-3,505 meters (8,000-11,500 feet).	Suitable habitat **potentially** exists within the project area
olive-sides flycatcher *Contopus borealis*	Old-growth conifers, aspen, openings with snags. Abundant dead trees bordering meadows, bogs.	Suitable habitat **potentially** exists within the project area
peregrine falcon *Falco peregrinus*	Rock, cliff, cave, canyon.	**No** suitable habitat, no potential for occurrence
purple martin *Progne subis*	Old growth aspen mixed with ponderosa pine, Douglas fir. Especially near water and open foraging area.	Suitable habitat **potentially** exists within the project area
sage sparrow *Amphispiza bellii*	Large patches (320 acres) of sagebrush	**No** suitable habitat, no potential for occurrence
trumpeter swan *Cygnus buccinator*	Riverine wetlands, lakes	**No** suitable habitat, no potential for occurrence
burrowing owl *Athene cunicularia*	Prairie dog towns below 2,743 meters (9,000 feet).	**No** suitable habitat, no potential for occurrence
white-tailed ptarmigan *Lagopus leucurus*	Alpine tundra	**No** suitable habitat, no potential for occurrence
yellow-billed cuckoo *Coccyzu americanus*	Open woodland w/ dense undergrowth, parks, riparian woodlands, urban areas w/ tall trees	**No** suitable habitat, no potential for occurrence

[1] Sensitive Species with potentially suitable habitat within the analysis area and potential for occurrence include the northern leopard frog, boreal toad, American marten, wolverine, pygmy shrew, boreal owl, northern goshawk, American three-toed woodpecker, olive-sided flycatcher, purple martin, and Brewer's sparrow. These species will be discussed further in this document.

[2] A finding of "no potential for occurrence" of a species is based on lack of current occurrence and unsuitable habitat for future occurrence. As the species does not have potential for occurrence, no impacts on the species will be incurred from the project. No further analysis is required.

The American marten, American three-toed woodpecker, olive-sided flycatcher, and Brewer's sparrow were positively confirmed within the Perfecto analysis area. Although the presence of the boreal toad, northern leopard frog, wolverine, pygmy shrew, boreal owl, northern goshawk, and purple martin were not positively confirmed, suitable habitat conditions may exist to support these species. For this reason, the potential effects of the proposed alternatives for the Perfecto Creek Timber Sale will be evaluated as if these

species were present. For a detailed description of each of these Sensitive Species' habitat and life history requirements, please see the Biological Evaluation for the Perfecto Creek Timber Sale, completed February 6, 2006.

Management Indicator Species

Management indicator species (MIS) are wildlife species that have been selected by a National Forest to represent the habitat needs of a larger group of species requiring similar habitats. Current management indicator species of the Grand Mesa, Uncompahgre and Gunnison National Forests include the Abert's squirrel, American marten, Brewer's sparrow, Merriam's turkey, northern goshawk, red-naped sapsucker, Rocky Mountain elk, and the common trout species. These species were considered for habitat suitability and potential for occurrence in the Perfecto analysis area.

Table 11. Management Indicator Species found on the GMUG National Forests, their habitat requirements, and their potential for occurrence in the Perfecto analysis area based on the November 2005 Management Indicator Species Assessment for the GMUG National Forests.

GMUG National Forests MIS Species List			
Common Name	**Scientific Name**	**Habitat Association**	**Potential Habitat or Species Present w/in the Project Analysis Area?**
Rocky Mountain Elk	Cervus elephus	Early-succession spruce-fir, Douglas fir, lodgepole, aspen, mountain shrub. MIS for travel mgmt.	Yes
Abert's squirrel	Sciurus aberti	Late-succession ponderosa pine	No[1]
American Marten	Martes americana	Late-succession spruce-fir, lodgepole pine	Yes
Northern Goshawk	Accipiter gentilis	Late-succession aspen	Yes
Brewer's sparrow	Spizella breweri	Sagebrush, open shrublands	Yes
Red-naped sapsucker	Sphyrapicus nuchalis	Aspen	Yes
Merriam's turkey	Meleagris gallopavo	Pinyon and juniper woodland, Gambel oak, ponderosa pine	No[1]
Common trout species	Oncorhynchus spp.	Aquatic and riparian	Refer to fisheries specialist report

[1] Species without habitat and that do not occur within the project area will not be directly, indirectly, or cumulatively impacted by the proposed activities. No further analysis is necessary.

Management Indicator Species with documented occurrences within the Perfecto analysis area include Rocky Mountain elk, American marten, Brewer's sparrow, and red-naped sapsucker. Detailed descriptions of the above species habitat and life history requirements, distribution, and population status and trend are available in the

Management Indicator Species Assessment for the Grand Mesa, Uncompahgre and Gunnison National Forests, November 2005.

Other Species and Habitats of Concern

Mature or Interior Forest Species -
Mature and interior forest species are those that rely on some or all components of mature or old growth habitats for a major part of their life history requirements. Additionally, interior forest species often require large blocks of contiguous forest habitat. Habitat components such as canopy closure, canopy layers, large trees, snags, downed wood, structural diversity, or a combination of these factors may be key species requirements. Mature and old growth forest habitats (Habitat structural stages 4A, 4B, 4C, and 5) comprise approximately 2,702 acres (56%) of forested habitats within the Perfecto analysis area. Approximately 2,019 acres (42%) of mature and old growth habitats contain canopy closures greater than 40% (4B, 4C, and 5).

Mature or interior forest species with documented occurrences in the Perfecto analysis area include the American martin, brown creeper, hermit thrush, Swainson's thrush, red squirrel, ruby-crowned kinglet, golden-crowned kinglet, and three-toed woodpecker.

Neotropical Migratory and Year-round Bird Species -
Neotropical migratory birds are those that breed in the U.S. and winter south of the U.S. border in Central and South America. Many passerine songbirds, hawks, owls, and shorebirds fall into this category. Nation-wide declines in population trends for Neotropical migrants have developed into an international concern. Efforts are now underway to examine population trends on wintering habitat in Central and South America as well as breeding habitat in the U.S.

Neotropical migrant point-count bird surveys in three habitat types within the Perfecto analysis area were conducted in 2003, 2004, and 2005, using a modification of the habitat-based point-count protocol developed by Huff et al. (2000). Table 12 reflects Neotropical migrant birds as well as year-round residents with documented occurrences within the Perfecto analysis area.

Table 12. Neotropical migrant and year-round bird species detected in the Perfecto Analysis Area by habitat type

Riparian			Spruce-fir		Open park	
American robin (23; 2005)	Lincoln's sparrow (22; 2004 & 2005)	Spotted sandpiper (3; 2005)	American robin (1; 2004)	Red crossbill (29; 2004)	American robin (10; 2005)	Red-breasted nuthatch (1; 2004)
American tree sparrow (18; 2003)	Mallard (1; 2004)	Three-toed woodpecker (2; 2004 & 2005)	Brown creeper(4; 2004 & 2005)	Red-breasted nuthatch (9; 2004)	American tree sparrow (5; 2003)	Red crossbill (7; 2004)
Brewer's blackbird (17; 2004)	Mountain bluebird (3; 2003)	Townsend's solitaire (1; 2005)	Chipping sparrow (5; 2004)	Red-tailed hawk (1; 2005)	Brewer's sparrow (1; 2003)	Red-naped sapsucker (2; 2005)
Brewer's sparrow (5; 2004)	Mountain chickadee (11; 2005)	Tree swallow (24; 2004)	Dark-eyed junco (16; 2005)	Ruby-crowned kinglet (58; 2003)	Chipping sparrow (17; 2005)	Ruby-crowned kinglet (11; 2005)
Chipping sparrow (4; 2004)	Northern flicker (11; 2004)	Vesper sparrow (24; 2004)	Golden-crowned kinglet (2; 2003)	Swainson's thrush (5; 2003)	Dark-eyed junco (18; 2004)	Song sparrow (2; 2003)
Cooper's hawk (1; 2004)	Olive-sided flycatcher (1; 2004)	Violet-green swallow (8; 2005)	Gray jay (12; 2004)	Three-toed woodpecker (2; 2004)	Gray jay (2; 2004)	Tree swallow (1; 2004)
Dark-eyed junco (35; 2005)	Pine grosbeak (4; 2004)	Warbling vireo (11; 2005)	Hairy woodpecker (1; 2005)	Warbling vireo (1; 2003)	Green-tailed towhee (1; 2005)	Vesper sparrow (32; 2004)
Gray jay (8; 2004)	Pine siskin (81; 2004)	Western wood pewee (11; 2003)	Hammond's flycatcher (1; 2003)	White-breasted nuthatch (1; 2005)	Hermit thrush (12; 2005)	Violet-green swallow (6; 2004)
Green-tailed towhee (1; 2005)	Red crossbill (1; 2004)	White-crowned sparrow (8; 2005)	Hermit thrush (30; 2004)	Yellow-rumped warbler (24; 2004)	Lincoln's sparrow (9; 2004)	Warbling vireo (1; 2005)
Green-winged teal (15; 2003)	Red-breasted nuthatch (1; 2004)	Wilson's warbler (8; 2005)	Mountain chickadee (24; 2005)		MacGillivray's warbler (1; 2004)	Western wood pewee (3; 2003)
Hairy woodpecker (2; 2005)	Red-naped sapsucker (4; 2004)	Yellow warbler (1; 2003)	Northern flicker (3; 2004)		Mountain bluebird (11; 2005)	Williamson's sapsucker (2; 2005)
Hammond's flycatcher (10; 2005)	Red-winged blackbird (1; 2004)	Yellow-rumped warbler (7; 2005)	Olive-sided flycatcher (1; 2004)		Mountain chickadee (3; 2005)	Yellow-rumped warbler (3; 2004)
Hermit thrush (4; 2004)	Ruby-crowned kinglet (18; 2005)		Pine grosbeak (4; 2005)		Northern flicker (9; 2004)	
House wren (1; 2003 & 2004)	Song sparrow (14; 2003 & 2004)		Pine siskin (75; 2004)		Pine siskin (49; 2004)	
Total Species: 40			**Total Species: 23**		**Total Species: 26**	

Numbers in parentheses refer to the high count, and year (or years) of high count, respectively.

When combining species detected from all three habitat types, a total of 46 species were detected, with the greatest species richness found in riparian habitats. Riparian areas occupy only five percent of the landscape within the Perfecto analysis area, yet they contain the greatest bird species diversity compared to adjacent forested and parkland habitats. Riparian areas are noted for their high biological productivity (Kauffman and Krueger 1984). In the western United States, species density, richness, biodiversity, biomass, and number of rare species are often much greater than those of adjacent uplands (Ohmart 1996).

Environmental Consequences

Habitat Capability

The habitat capability model (Habcap) is a computerized tool for quantitative habitat analysis. Habcap provides estimates of the capability of habitats to support wildlife species based on the mix of vegetation cover types and structure present in an area. By comparing current with estimated conditions after treatment, an indication of effects on habitat quality can be assessed (Smith 2000). This model was developed for application at the project area and project area analysis levels for Forest Plan implementation and is utilized as one of the tools for estimating the impacts of the proposed alternatives on sensitive species habitat. The model generates a Habitat Capability Index (HCI) value that is a measure of overall habitat value of an area based on forage and cover quantity and quality. An HCI value of 1.0 represents optimum habitat and 0.0 is considered unsuitable.

Habitat capability index values for Management Indicator Species and mature or interior forest species are presented in table 13. Selection of mature or interior forest species for Habcap analysis was based on documented occurrence within the Perfecto analysis area, suitable habitat or potential occurrence within the analysis area, and whether habitat capability information was available for the species. The American marten, northern goshawk, and three-toed woodpecker are identified as Management Indicator, Sensitive, and mature interior forest species. To avoid repetition, discussion of effects on these species is discussed primarily under Sensitive Species.

Table 13. Habitat capability values for Management Indicator Species, mature or interior forest species, Neotropical migrant or year-round bird species, and other species detected or with habitat present in the Perfecto analysis area.

Species	Habitat Capability Index		
	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Old Growth Retention & Aspen Stand Improvement)
Mature or interior forest species			
American Marten[1]	0.59	0.56	0.57
Brown creeper (Year-round)	0.43	**0.38**	0.40
Golden-crowned kinglet (Summer)	0.55	0.54	0.53
Northern Goshawk (Summer)[1]	0.56	0.56	0.55
Northern Goshawk (Winter)[1]	0.53	0.53	0.53
Red squirrel	0.76	0.75	0.75
Southern Red-backed vole	0.74	0.74	0.74
Ruby-crowned kinglet	0.69	0.68	0.68
Three-toed Woodpecker (Year-round)[1]	0.44	**0.39**	0.41
Northern saw-whet owl	0.64	0.61	0.62
Management Indicator Species			
American Marten (Year-round)[1]	0.59	0.56	0.57
Northern Goshawk (Summer)[1]	0.56	0.56	0.55
Northern Goshawk (Winter)[1]	0.53	0.53	0.53
Rocky Mountain Elk (Summer)[2]	0.45	0.45	0.46
Red-naped Sapsucker (Summer)	0.59	0.59	0.59
Neotropical Migrant Birds, Year-round Birds, and Other Species Detected or With Habitat Present			
Mountain Bluebird (Summer)	0.41	0.42	0.42
Pine Grosbeak (Summer)	0.72	0.69	0.79
Pine Grosbeak (Winter)	0.72	0.69	0.79
Blue Grouse (Summer)	0.82	0.84	0.84
Blue Grouse (Winter)	0.71	0.71	0.71
Golden-crowned Kinglet (Summer)	0.55	0.54	0.53
Ruby-crowned Kinglet (Summer)	0.69	0.68	0.68
Red-breasted Nuthatch	0.70	0.70	0.70
White-breasted Nuthatch	0.50	0.50	0.50
Vesper Sparrow (Summer)	0.74	0.74	0.74

White-crowned Sparrow (Summer)	0.41	0.41	0.41
Warbling Vireo (Summer)	0.48	0.50	0.49
MacGillivray's Warbler (Summer)	0.84	0.84	0.84
Wilson's Warbler	0.67	0.67	0.67
Black Bear	1.00	1.00	1.00
Snowshoe Hare	0.52	0.51	0.52
Moose	0.76	0.76	0.76
Deer Mouse	0.55	0.57	0.57

[1] These species are also Region 2 Sensitive Species
[2] The Perfecto analysis area does not occur in elk winter range, thus habitat capability was not determined for winter habitat.

Management emphasis for the Perfecto analysis area includes livestock grazing (6B; 2,244 acres) and timber management (7A; 4,615 acres). Habitat capability requirements are management area specific. According to the Amended Land and Resource Management Plan for the Grand Mesa, Uncompahgre and Gunnison National Forests (1991), habitat capability should be maintained at least at 40% (HCI $\geq$ 0.40) and 60% (HCI $\geq$ 0.60) for the above species within 7A and 6B management areas, respectively. The majority of habitat for the above species occurs in the 7A management area, thus habitat capability requirements are met for these species except for the three-toed woodpecker and brown creeper under alternative 2. Since HCI values for brown creeper and three-toed woodpecker do not meet minimum standards, selection of alternative 2 would require a non-significant Forest Plan amendment to meet the requirements of the National Forest Management Act. Given that all harvest units are in the 7A management area, habitat capability will not be affected in the 6B management area.

Alternative 1 – No Action

No changes in wildlife habitats are expected beyond the effects of natural succession and environmental processes. Timber stands that were previously harvested or experienced windthrow and/or insect caused mortality will continue to regenerate, mature, and develop as two or multi-storied forest stands. Mature spruce-fir stands will develop into old growth stands with time. Mature spruce-fir stands that currently have an even age-class of over-story trees will take longer to develop old growth characteristics than stands with a diversity of age-classes and multi-canopy layers. Disturbances such as insect mortality and windthrow will create forested areas with more open overstory canopies, stimulating regeneration of trees, shrubs, grasses, and forbs. Tree mortality will provide habitat for woodpeckers, nuthatches, and other species that use snags. In addition, snags will eventually become incorporated into the course woody debris component on the forest floor. Aspen regeneration will likely be precluded by Engelmann spruce and subalpine fir in mature mixed conifer-aspen stands without disturbances such as fire, insect mortality, or windthrow.

Mature (4A, 4B, and 4C) and old growth (5) structural stages comprise 56% of the forested habitat in the Perfecto analysis area. Core habitat areas were identified within the analysis area as habitat structural stages 4B, 4C, and 5, with an interior buffer of 65 meters. Core habitat areas provide habitat for species that require relatively large blocks of mature interior forest and are not commonly found in early successional forests. Core habitat comprises 29.8% (1,478 acres) of forested habitat in the Perfecto analysis area.

Core habitat is expected to increase over time as stands reach a mature condition and overstory canopies fill in, especially if fire suppression continues. The Perfecto analysis area also provides habitats for species that benefit from a variety of seral stages that are well-distributed throughout their home range. A forest patch analysis was conducted for the Perfecto analysis area to examine habitat connectivity and spatial distribution of core habitat. Forest patches were categorized based on habitat structural stage and percent canopy cover. Figure 1A reflects the acreage distribution of forest patch categories, and figure 1B shows the spatial distribution of forest patches and core habitat areas.

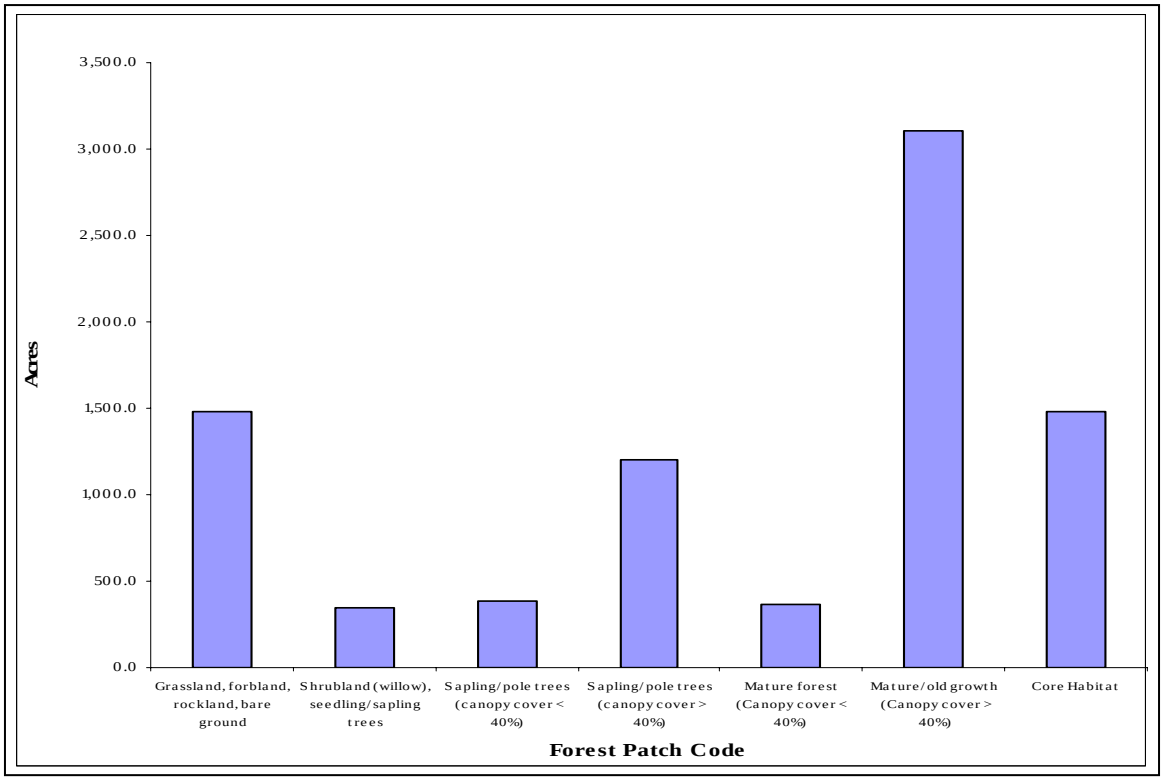

Figure 1A. Acreage distribution of forest patches within the Perfecto analysis area. Core habitat was derived by applying a 65 meter interior buffer (beginning at the forest edge and extending 65 meters inside forest stands) to the Mature/old growth (Canopy cover > 40%) category. Wildlife species dependent on mature interior forest utilize these core habitat areas.

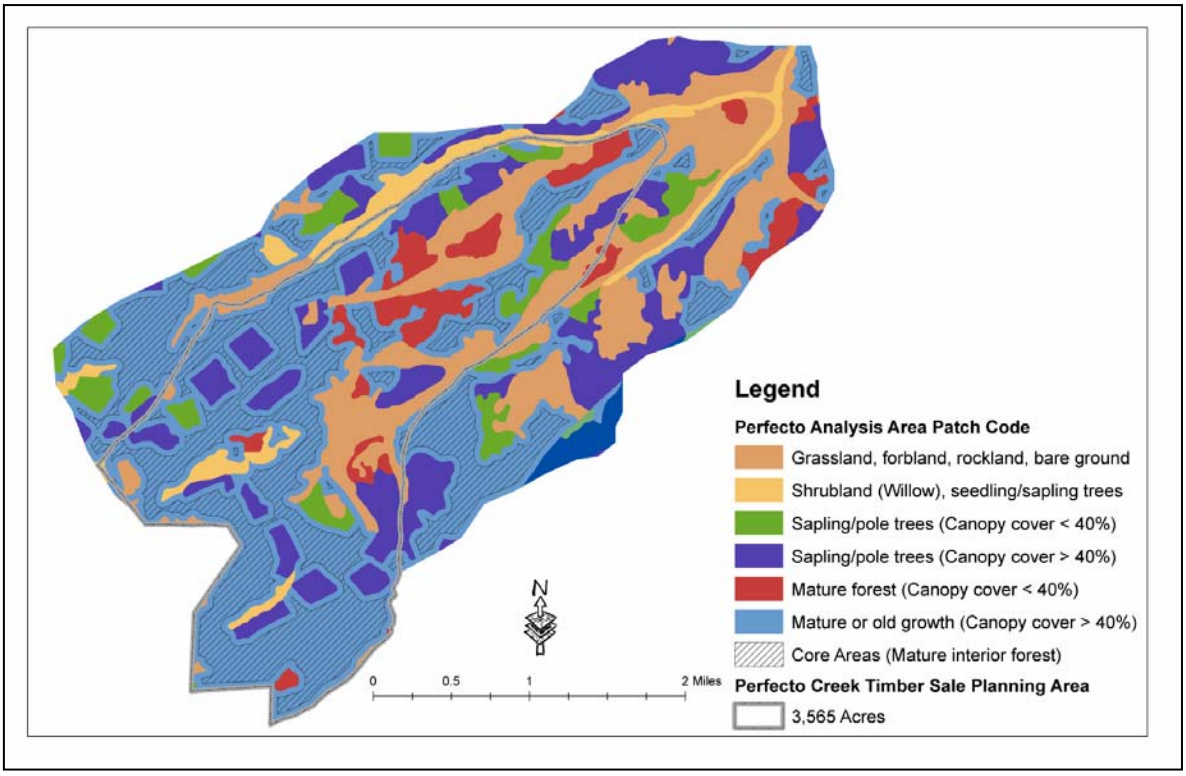

Figure 1B. Spatial distribution of forest patches and core habitat areas within the Perfecto analysis area.

Open roads are a form of internal fragmentation (fragmentation resulting from linear corridors dissecting an area; Meffe et al. 2002), which makes habitat less desirable and less effective for some wildlife species, especially area-sensitive species (species that require large areas to survive and reproduce, such as mature interior forest species). Roads allow increased human access into wildlife habitats. Disturbance by humans and vehicles on roads causes habitat to be less secure for wildlife. Disturbance during critical time periods such as winter and breeding seasons may be especially negative and could lead to displacement of individuals or a change of wildlife travel routes and movement patterns. Changes in wildlife distribution may lead to increased vulnerability to mortality through predation, energy expenditure in winter, or loss of critical food resources as species shift their use to less suitable habitat. Road use also results in direct mortality to wildlife through vehicle collisions. Currently, there are a total of 15.65 miles of open roads and 3.43 miles of closed roads within the 6,870 acre (10.7 mi^2) Perfecto analysis area. Actual open road density is calculated at 1.5 miles per square mile (15.65 mi/10.7 mi^2). Adjusted road density for habitat effectiveness for elk is 0.62 miles per square mile. The Habitat Capability model yielded a habitat effectiveness value of 0.71 for the road effect on elk. The open road density analysis includes all roads or trails with any motorized use and considers the average daily traffic rate and type of road. Under the No Action Alternative, there would be no opportunity to reduce open road density. Current road impacts to wildlife and their habitats would continue.

Recreational activities in the Perfecto analysis area, primarily associated with roads as described above, will continue to affect wildlife similarly into the future. Winter

snowmobile activity, fall hunting, and activities associated with existing travel routes would continue as described in the recreation section of this document. Wildlife would continue to be impacted primarily from human disturbance along road corridors, as well as human access into wildlife habitats facilitated by roads. Hunting and vehicle collisions would likely be a factor in wildlife mortalities. In addition, habitat degradation resulting from vehicles and dispersed camping would continue. Firewood gathering along open roads will continue to remove snags and downed logs used by wildlife. As described previously, the analysis area contains abundant dead trees (9.8 snags per acre) and logs (105 linear feet per acre) for wildlife as a result of insect activity, windthrow, and other sources of mortality. Much of this course woody debris is inaccessible to firewood cutters due to topography and location of potential firewood relative to open roads. Since there would be no opportunity to reduce open road density under the No Action Alternative, firewood gathering would continue to reduce course woody debris adjacent to all open roads.

Threatened, Endangered, and Candidate Species -
The Perfecto analysis area contains suitable habitat for the Canada lynx. The 6,870-acre Perfecto analysis area is located entirely within the 57,000-acre Stewart Creek Lynx Analysis Unit (LAU) and contains potential habitat for lynx consisting of denning, winter foraging, and other lynx habitat (Table 14). Other lynx habitat is defined as capable lynx habitat but currently not denning or winter foraging habitat (Grand Mesa, Uncompahgre and Gunnison National Forest 2001). Stands mapped as other lynx habitat offer additional foraging opportunities during non-snow seasons and are within a matrix of higher-quality habitat but lack the structural attributes necessary to sustain year-round snowshoe hare populations (Grand Mesa, Uncompahgre and Gunnison National Forest 2001). Other lynx habitat often constitutes stands that are in close proximity to high-quality snowshoe hare habitat.

Table 14. Environmental baseline status of lynx habitat within the Stewart Creek LAU

Habitat Description	Acres of Habitat Within LAU[1]	Percent of all Lynx Habitat Within LAU[1]
Winter Forage	9,835.3	28.6
Denning	6,907.8	20.1
Other	16,895.7	49.2
Unsuitable	702.7	2.1
Total Lynx Habitat	34,341.5	100
Total Acres in LAU	57,000	

[1]Field verified and updated in the Perfecto Creek Timber Sale project area.

Lynx habitat comprises 60.25% of the Stewart Creek LAU. Non-habitat comprises 39.75% (22,657.8 acres) of the 57,000-acre LAU and is not reflected in Table 14. Unsuitable habitat within the Stewart Creek LAU is primarily attributed to past timber harvest activities. The Stewart Creek LAU contains a relatively low amount of denning habitat due to a lack of late successional forest with greater than 40% canopy cover (spruce-fir, moist mixed conifer with less than 10% pine, or aspen with > 40% conifer component). Under the No Action Alternative, there will be no change in the quantity and spatial distribution of lynx habitat types except changes associated with natural succession and environmental processes (i.e., wildfire, forest insect and disease

outbreaks, windthrow, etc). Additional information on this species habitat needs and a complete analysis of effects can be found in the Biological Assessment for the Perfecto Creek Timber Sale, January 10, 2006.

Sensitive Species -
The Perfecto analysis area provides suitable habitat for species that rely on relatively dense, high elevation forested habitats such as the American marten, boreal owl, northern goshawk, olive-sided flycatcher, pygmy shrew, and three-toed woodpecker. American marten, olive-sided flycatcher, and three-toed woodpecker are known to occur within the analysis area. A limited amount of habitat is present within the analysis area for wide-ranging species such as the wolverine. This species has habitat requirements that exist either in limited amounts or the analysis area would provide only a small amount of the total habitat required due to this species large home range.

Under the No Action Alternative, no change in available habitat is expected for any of these species other than changes associated with natural succession and environmental processes. Additional tree mortality in dense, suppressed and decadent stands will provide improved habitat for cavity dependent species including three-toed woodpecker, marten, boreal owl, flammulated owl, and perch sites for olive-sided flycatcher. An increase in down wood for the same reasons will provide improved habitat for marten, pygmy shrew, and small mammals that provide prey for goshawk and boreal owl.

Habitat capability is considered marginal for the three-toed woodpecker, with a current value of 0.44. The Perfecto area provides foraging and nesting habitat for three-toed woodpecker in terms of mature spruce-fir (4A - 5 habitat structural stages), as well as abundant snags that are well-distributed throughout the analysis area. Three-toed woodpeckers have been detected during field inventories and point-count surveys, primarily within mature interior forest stands.

No changes in habitat use or population numbers for sensitive species are anticipated under the No Action Alternative. Additional information on these species habitat needs and a complete analysis of impacts can be found in the Biological Evaluation for the Perfecto Creek Timber Sale, February 6, 2006.

Management Indicator Species -
The Perfecto analysis area is totally contained within Colorado Division of Wildlife elk data analysis unit (DAU) E-25. Population objectives for elk in this DAU are 4,500. From 1980 to 2004, E-25 has been above elk population objectives. In 2002 and 2003, the estimated populations of 4,540 and 4,530 were near Population Objectives.

Currently, relatively low forage is available due to a high amount of mature and overmature (4A–5) forested habitats, the effects of road use, and ongoing recreation activities act to minimize elk habitat effectiveness (see Table 13, Habitat Capability for Management Indicator Species). Habitat effectiveness will remain relatively low (0.45) for elk in the area, but still above minimum GMUG National Forest standards and guidelines. The analysis area is not within elk winter range but receives spring, summer

and fall use. Elk may utilize the dense cover during the day or during periods of activity on the major roads in the area and then move into adjacent areas that provide greater forage availability, such as the willow riparian areas within Perfecto and Chavez Creeks and the adjacent parklands. Elk have been observed foraging in willow riparian habitats within the Perfecto analysis area.

The Perfecto analysis area provides marginal and high quality summer foraging and cover habitat for the red-naped sapsucker in terms of willow riparian areas along Perfecto and Chavez Creeks and aspen stands adjacent to these willow riparian areas. Habitat capability under the No Action Alternative is at 0.59, which is above minimum (0.40) GMUG National Forest standards and guidelines for Management Indicator Species. Red-naped sapsuckers have been observed foraging in willow riparian areas in Perfecto Creek and in mature aspen stands along Pauline and Perfecto Creeks.

No change in habitat use or populations of management indicator species is anticipated with the No Action Alternative other than natural succession and environmental processes. See the Sensitive Species section above for discussions on the northern goshawk and American marten.

Mature or Interior Forest Species –
Mature or interior forest species with habitat capability information in the diversity unit include the brown creeper, red squirrel, red-backed vole, golden-crowned kinglet, ruby-crowned kinglet, northern saw-whet owl, American marten, northern goshawk, and three-toed woodpecker. The brown creeper, red squirrel, golden-crowned kinglet, ruby-crowned kinglet, American marten, and three-toed woodpecker are known to occur within the project area. Of these species, the Perfecto analysis area provides the highest habitat capability values for the red squirrel (0.76) and southern red-backed vole (0.74). This is primarily due to the high percentages of mature spruce-fir with greater than 40% canopy cover. The brown creeper and three-toed woodpecker have the lowest habitat capability values (0.43 and 0.44, respectively). Although these species utilize spruce-fir habitat and have been documented within the analysis area, they also use other coniferous forest types. The low habitat capability values for these species may be due to the absence of ponderosa pine, Douglas fir, and mature lodgepole pine within the analysis area. Under the No Action Alternative, habitat quantity and quality may increase in terms of mature or interior forest. However, the No Action Alternative does not provide the opportunity for road closures. Road closures would improve habitat connectivity by reducing motorized disturbances.

Neotropical Migrant and Year-round Bird Species-
Forty-six species of Neotropical migrant and year-round birds were documented within the Perfecto analysis area (See Table 12). As previously mentioned, species richness was greatest in riparian habitats. Bird species that are riparian obligates (e.g., Wilson's warbler), riparian dependents (e.g., red-naped sapsucker), or utilize habitat edges (e.g., mountain bluebird) were detected in willow riparian and parkland habitat types. Habitat for these species occurs primarily within the 6B Management Area (livestock grazing).

For bird species integrated into the Habitat Capability Model and utilizing habitat within the 6B Management Area, habitat capability indices are above 60% for all species except mountain bluebird and white-crowned sparrow (See Table 13). Habitat capability for these species is not expected to decline under the No Action Alternative.

Although bird species richness was lowest in the spruce-fir habitat type, species detected in this habitat were more typically habitat specialists (e.g., three-toed woodpecker and brown creeper). Birds utilizing forested habitat occur in the 7A Management Area (timber management). For bird species integrated into the Habitat Capability Model and utilizing habitat within the 7A Management Area, habitat capability indices are above 40% for all species. With the exception of the red-naped sapsucker and warbling vireo, habitat capability for these species is not expected to decline under the No Action Alternative. The red-naped sapsucker and warbling vireo both use aspen habitats. Unless disturbances (both natural and human caused) that would facilitate aspen regeneration and dominance in some areas occur, aspen habitats are expected to decline due to encroaching conifers, resulting in decreased habitat capability for species utilizing aspen habitats. As mature spruce-fir habitats increase, along with subsequent increases in course woody debris, habitat capability may increase for species such as the three-toed woodpecker and brown creeper.

Alternative 2 – Proposed Action & Alternative 3 – Old Growth Retention and Aspen Stand Improvement

Timber harvest activities in the Perfecto analysis area may have contrasting effects on different wildlife species. Changes in forest habitat structure and composition may benefit some species, while decreasing habitat quantity and quality for others. Harvest activities typically focus on timber stands that have high defect, suppressed growth, spruce beetle infestations, and where root rot, stem decay and mortality are common, as well as where conifer species are suppressing aspen regeneration or beginning to prevail in stands that were once dominated by aspen. Timber harvest is expected to accelerate stand regeneration by allowing sunlight, precipitation, and nutrients to reach seedlings and existing understory vegetation. Where proposed harvest units occur in conifer stands that contain aspen, the proposed treatments are designed to favor the retention and regeneration of aspen. Overstory trees, including snags, would be retained in and adjacent to harvest units as wildlife trees for woodpeckers and other cavity nesting birds, as well as for perch sites, singing, hunting, and foraging. Proposed group selection treatments would create small openings that may stimulate the growth of grasses, forbs, shrubs, and conifer seedlings, which would provide habitat for small mammals (e.g., chipmunks, voles, and mice), ground feeding or open-woodland birds (e.g., northern flicker, dark-eyed junco, mountain bluebird, and blue grouse), and summer foraging habitat for big game species (e.g., deer, elk, and black bear). Reductions in canopy cover and tree density may displace some birds that are canopy feeders such as ruby-crowned kinglets and golden-crowned kinglets.

Proposed timber harvest activities will remove trees that are potential nesting, denning, and foraging trees for wildlife, resulting in reduced habitat quality. However, an abundance of remaining trees both within harvest units and in the surrounding unharvested stands will provide an adequate number of trees for nesting, denning, and

foraging. Additionally, snags, snag replacement trees, large diameter old trees, downed logs, and trees with visible wildlife use will be specifically maintained in the project area to minimize loss of nesting, denning, and foraging habitat. Snag and down wood numbers as identified previously (9.8 snags/ac and down logs at 105 linear ft/acre) exceed Forest Plan Standards and Guidelines. In areas where no salvage component has been identified, existing snags and logs will remain on site except where removed for safety reasons. In units proposed for sanitation salvage (total of 8 acres), design criteria will be applied to ensure maintenance of snags and logs to meet Forest Plan Standards and Guidelines and wildlife habitat requirements. Retaining some slash, whether lopped and scattered, crushed during post sale activities, or piled, will maintain hiding cover for small mammals. Maintaining a minimum of 10 – 20 tons of coarse woody debris per acre will maintain soil moisture at ground level for mosses, fungi, and lichens and will encourage faster re-colonization of harvest units by small mammals and other prey species. Maintaining Engelmann spruce and subalpine fir seedling, sapling, and pole sized trees will benefit snowshoe hares and thus lynx.

Wildlife may be temporarily displaced while harvest activities take place. This includes avoidance of haul routes during active hauling. It is expected that any displaced wildlife will return soon after logging activities cease. Connectivity for wildlife between forest stands in the project area will be maintained with the proposed harvest as the majority of treatments will maintain the 4B structural stage, providing suitable travel cover for wildlife species. Where harvesting is proposed in aspen stands or spruce-fir stands with an aspen component (Units 8, 14, and 15), adequate adjacent cover will be maintained to provide connectivity between stands and habitats. There are some proposed harvest units that occur at least partially on wide or gentle sloping ridges (Units 5, 6, 7, and 13), but habitat connectivity will be maintained since the majority of treatments in these areas will not reduce habitat structural stages below a 4B condition. Shelterwood treatments may alter wildlife movements but are not expected to be a barrier to movement or prevent wildlife dispersal due to relatively small unit size (shelterwood units range from 14.5 – 22.8 acres). In addition, mature or old growth spruce-fir will be maintained adjacent to shelterwood treatments. Riparian areas will retain their vegetative cover and continue to serve as travel connections for wildlife.

Similarly to the No Action Alternative, a forest patch analysis was conducted to estimate the effects of Alternatives 2 and 3 on habitat connectivity and mature interior forest habitat. Table 15 reflects the acreage distribution of forest patch categories and core habitat for all alternatives. Figures 2A and 2B show the spatial distribution of forest patches and core habitat areas, which gives an indication of habitat connectivity and amount of core habitat that would occur within the analysis area following Alternatives 2 and 3. Refer to Figure 1B for a spatial representation of forest patches and core habitat under Alternative 1.

Table 15. Forest patch and core habitat analysis for the Perfecto analysis area.

Alternative	Patch Code [1]						Core Habitat[2]	Core Habitat % of Patch Code 6[3]	Core Habitat % of Analysis Area[4]	Core Habitat % of Forested Habitat W/in Analysis Area[5]
	1	2	3	4	5	6				
Analysis Area Conditions Under Alt. 1	1,478.4	341.4	381.9	1,197.7	365.9	3,105.2	1,477.9	47.6	21.5	29.3
Analysis Area Conditions Under Alt. 2	1,478.4	341.4	383.6	1,196.0	454.6	3,016.4	1,403.1	46.5	20.4	27.8
Analysis Area Conditions Under Alt. 3	1,478.4	341.4	392.2	1,187.3	484.3	2,986.8	1,393.7	46.7	20.3	27.6

[1] Patch Codes: 1 = Grassland, forbland, rockland, or bare ground; 2 = Shrubland (Willow) or seedling/sapling trees; 3 = Sapling/pole trees (canopy cover < 40%); 4 = Sapling/pole trees (canopy cover > 40%); 5 = Mature forest (canopy cover < 40%); 6 = Mature or old growth (canopy cover > 40%)

[2] Considered mature interior forest habitat; derived by applying a 65 meter interior buffer to mature or old growth forest stands with a canopy cover > 40% (patch code 6)

[3] (Core habitat / patch code 6) x 100

[4] (Core habitat / 6,870) x 100

[5] (Core habitat / ∑patch codes 3, 4, 5, 6) x 100

When compared to the No Action Alternative, Alternatives 2 and 3 would result in a 5.1% and 5.7% reduction in core habitat, respectively. Under Alternative 3, the Perfecto analysis area would contain the least core habitat because there are more acres being treated for aspen rehabilitation than in Alternative 2. Aspen rehabilitation treatments would shift mature stands with greater than 40% canopy cover to a 4A habitat structural stage. There is no difference between proposed shelterwood harvests for both Alternatives 2 and 3; consequently, shelterwood treatments would reduce the same amount of core habitat under these alternatives. Group selection, individual tree selection, and sanitation salvage do not reduce core habitat, although these treatments do decrease habitat quality for certain species because of reductions in canopy cover and tree density.

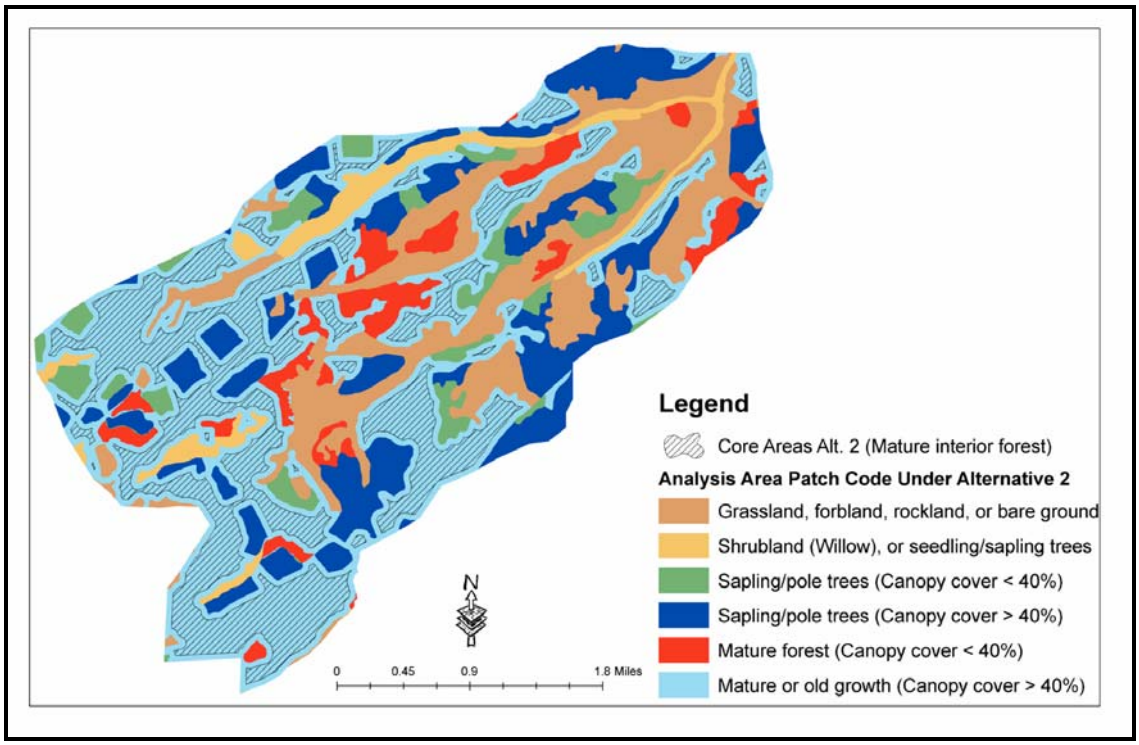

Figure 2A. Spatial distribution of forest patches and core habitat areas within the Perfecto analysis area after Alternative 2.

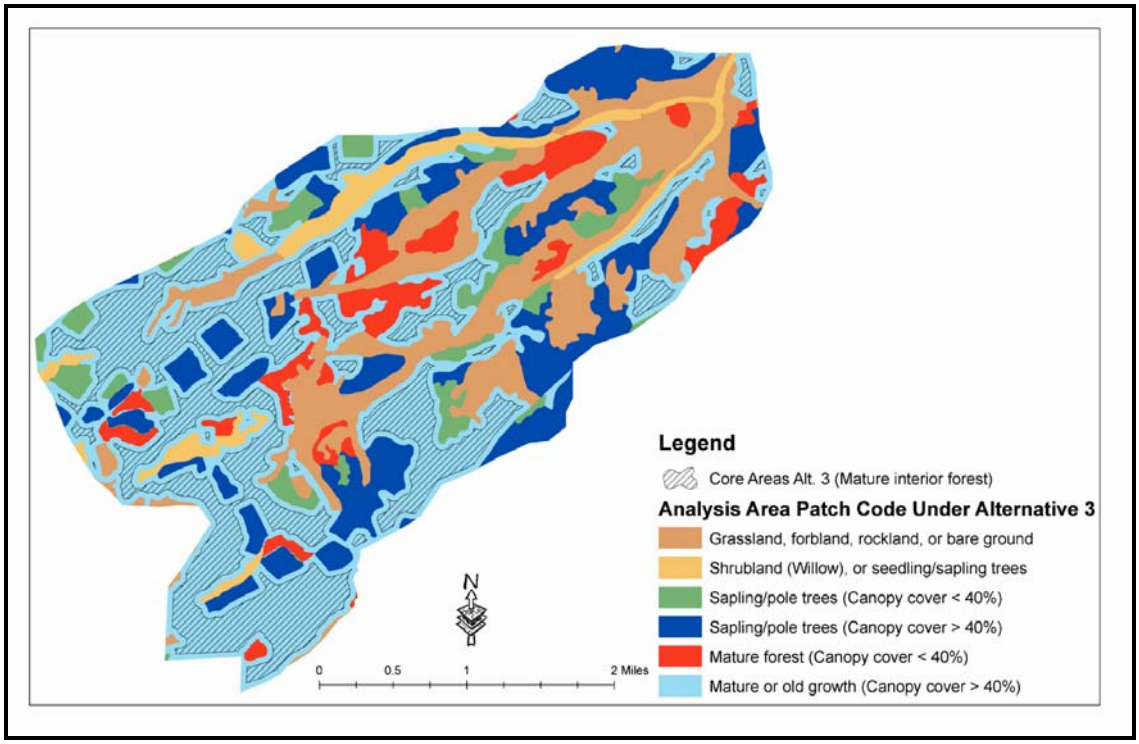

Figure 2B. Spatial distribution of forest patches and core habitat areas within the Perfecto analysis area after Alternative 3.

Protection measures for riparian areas and stream habitat are incorporated into the design of the timber sale and mitigation measures. Proposed harvest units are outside of riparian

and aquatic habitats and have adequate vegetated buffers in between. Moist sites within harvest units that may provide habitat for wildlife species such as the pygmy shrew will be protected by avoidance. Wildlife species that may use these habitats are not expected to be impacted by the proposed timber harvests. For information on protection measures and buffers for riparian zones, please see the hydrology section of this Environmental Assessment.

Temporary road construction, road reconstruction, road closures, and road obliteration is proposed for alternatives 2 and 3. All temporary roads would be obliterated upon completion of harvest activities. Road densities will decrease from 1.5 to 1.2 mi per mi^2 in both action alternatives. Effects on wildlife species from all road construction activities are expected to be temporary, coinciding with their time of use for disturbance and displacement, as well as the length of time the habitat takes to recover following road closures and obliteration. No irreversible or irretrievable road effects are expected on wildlife with Alternatives 2 and 3. The No Action Alternative, however, does not provide the opportunity to reduce road effects.

Threatened, Endangered, and Candidate Species –

Canada Lynx

Field surveys for wildlife and habitat assessments were conducted in the Perfecto analysis area from 2000 to 2005. Snowtracking surveys, sooted track plates, and photographic bait stations based on methodologies described by Zielinski and Kucera (1995) were implemented in 2003 and 2004 within the analysis area to identify the presence of forest carnivores. There were no known lynx occurrences documented from these surveys. The determination that there is a potential for occurrence of lynx is based on known habitat preferences and the availability of habitat within the analysis area.

High quality lynx habitat is described as a mosaic of early successional (created by small scale disturbances) and late successional forested habitats with little or no human disturbance. Early successional habitats support snowshoe hares, the main prey item of foraging lynx, and late successional forests with abundant course woody debris provides denning habitat in addition to thermal and security cover for kittens. Intermediate successional stage forests, though not required by lynx, provide travel cover and connectivity between foraging and denning habitat (Ruggiero et al. 1994).

As discussed previously in the environmental baseline, the Perfecto analysis area contains potential denning, winter foraging, and other lynx habitat (Appendix A, Map 7). Within the 6,780-acre analysis area there are currently 656 acres of old growth (9.5%), 193 acres of 4C (mature forest with canopy cover of 71 – 100%; 2.8%), 1,170 acres of 4B (mature forest with canopy cover of 41 – 70%; 17%), and 683 acres of 4A (mature forest with canopy cover less than 40%; 9.9%). Sapling and pole timber stands (3A and 3B) comprise 2,116 acres (30.8%), and shrublands contain 305 acres (willow vegetation; 4.4%). The remaining 1,688 acres of the analysis area are mountain grassland habitats (1,658 acres; 24.1%) and talus, scree, or bare soil (30 acres; 0.44%).

Proposed activities associated with the Perfecto Creek Timber Sale will affect 910 acres in alternative 2 and 780 acres in alternative 3. Alternative 2 includes 688 acres of lynx denning habitat, 40 acres of winter foraging habitat, and 168 acres of other lynx habitat. Alternative 3 includes 562 acres of denning habitat, 22 acres of winter foraging habitat, and 181 acres of other lynx habitat. The remaining acres for both alternatives are non-habitat inclusions within unit boundaries. Silvicultural treatments will result in changes in some lynx habitat types, whereas some lynx habitat types will not be changed. Tables 16 and 17 reflect changes in lynx habitat distribution within the Stewart Creek LAU as influenced by the proposed alternatives.

Table 16. Changes in lynx habitat distribution within the Stewart Creek LAU as affected by Alternative 2[1]

Habitat Description	Total Habitat Acres Existing Condition	Total Habitat Acres Post-treatment	Acres Changed by Project	Change in the Percent of Habitat W/in LAU	Updated Percent of all Lynx Habitat in LAU
Winter forage	9,835.3	9,835.3	0	0	28.6
Denning	6,907.8	6,838.2	69.6 (decrease)	-1.01	19.9
Other	16,895.7	16,965.3	69.6 (increase)	+0.41	49.4
Unsuitable	702.7	702.7	0	0	2.1
Total lynx habitat	34,341.5	34,341.5	69.6	0.20	100

[1] Reflects the proposed action

Table 17. Changes in lynx habitat distribution within the Stewart Creek LAU as affected by Alternative 3

Habitat Description	Total Habitat Acres Existing Condition	Total Habitat Acres Post-treatment	Acres Changed by Project	Change in the Percent of Habitat W/in LAU	Updated Percent of all Lynx Habitat in LAU
Winter forage	9,835.3	9,835.3	0	0	28.6
Denning	6,907.8	6,838.2	69.6 (decrease)	-1.01	19.9
Other	16,895.7	16,965.3	69.6 (increase)	+0.41	49.4
Unsuitable	702.7	702.7	0	0	2.1
Total lynx habitat	34,341.5	34,341.5	69.6	0.20	100

Tables 16 and 17 indicate that alternatives 2 and 3 have the same affect on lynx habitat in terms of changes in habitat type. However, both alternatives differ in their affect on old growth and habitat connectivity, thus they also affect lynx habitat quality differently. Silvicultural treatments that change 69.6 acres of lynx denning habitat to other lynx habitat are shelterwood harvests and aspen rehabilitation treatments. Denning habitat acres impacted by shelterwood and aspen rehabilitation treatments are the same for both alternatives, which is why acres of lynx habitat changed is the same in both alternatives. The difference between the two alternatives is the number of acres treated using group and individual tree selection methods. Fewer acres are proposed for selection treatments in alternative 3 than in alternative 2. Selection treatments will not change the lynx habitat type, but rather the quality of existing habitat because of reductions in forest cover.

In alternative 2, there would be a 25% reduction in forest cover for 610 acres of lynx denning habitat. Quantitatively, openings of ¼-acre in size and additional reductions in

canopy cover associated with skid trails and temporary roads would comprise approximately 152.5 acres of the 610 acre area. The remaining 457.5 acres would not be impacted by treatment activities. In alternative 3, there would be a 25% reduction in forest cover for 484 acres of lynx denning habitat. Selection treatments would remove approximately 121 acres of forest cover from the 484 acre area, with the remaining 363 acres untouched by treatment activities. Despite the reductions in forest cover from denning habitat in the two alternatives, canopy cover would remain above 40% for stands treated. Residual stands remain, and because only small groups of ¼-acre or less in size are treated within much larger stands, the downed woody component also remains. Development of design criteria will ensure the maintenance of course woody debris for lynx.

The above acres of proposed group and individual tree selection would result in maintaining or creating forest stands classified as 4B that would retain much of their original forest structure. After harvesting is completed, these stands are predicted to still be suitable for lynx. Mature conifer forests often provide the best potential lynx denning habitat due to its closed canopy and the abundance of large downed woody debris such as logs and upturned stumps. Windthrow areas also provide the vertical and horizontal physical structure desirable to lynx. Such attributes contain the best security and thermal cover that protects lynx kittens. As described above, group and individual tree selection harvesting proposed in alternatives 2 and 3 would open up overstory canopies, reducing habitat quality for potential lynx denning. Harvest units that retain a higher level of canopy cover and large downed woody debris would provide better potential denning habitat. The suitability of lynx denning habitat in group and individual tree selection units after harvesting will depend on the overstory condition and whether concentrations of course woody debris of appropriate size and abundance are present. Despite reductions in the quality of lynx denning habitat, existing and newly created 4B stands will still serve as travel corridors and provide habitat connectivity for dispersing lynx and between higher quality denning habitat and foraging areas. These stands will also continue to support red squirrels as a prey source for lynx.

Within group selection units, harvest would remove some trees that are potential nesting, denning, and foraging trees for red squirrels, an important alternative prey species for lynx. The abundance of remaining trees both within harvest units that result in 4B mature forest stands, as well as the surrounding stands not proposed for harvesting provides sufficient trees for these uses. In addition, snags, snag replacement trees, large diameter old trees, downed logs, upturned stumps, squirrel middens, and trees with visible sign of wildlife use would be specifically maintained in the project area to minimize loss of nesting, denning, and foraging sites for red squirrels. Retaining some slash, whether lopped and scattered, crushed during machine scarification, or piled, would maintain hiding cover for lynx, snowshoe hare, and other small mammal prey species.

Openings (up to ¼ acre in size) created from the removal of small pockets or interspersed trees within proposed units would increase understory vegetation, new seedling regeneration, and growth of existing seedling/sapling understory trees within forest stands. New herbaceous vegetation and trees on the forest floor attract prey species

including snowshoe hare, the primary prey species for lynx. Snowshoe hares feed on woody seedlings and saplings and are especially abundant in young conifer stands that are 13 – 30 years old that have high stem densities (Ruggiero et al. 1994). Removal of selected trees allows for faster and larger growth of the remaining trees, and stimulates regeneration of new seedlings.

Early successional forest inclusions created within selection harvest stands will provide future lynx foraging habitat and increase stand diversity. Within the forest dominated project area, newly created areas of early successional forest with new young trees and herbaceous vegetation would provide future habitat for snowshoe hares and other lynx prey species, thus improving foraging habitat for lynx. Snowshoe hares are known to seek out young dense conifer thickets to feed on seedlings and saplings and protect themselves from cold weather and predators (Ruggiero et al. 1994). Since the residual stand remains in selection harvest units (457.5 acres in alt. 2; 363 acres in alt. 3), harvested units would continue to provide habitat for snowshoe hares and denning habitat for lynx immediately following harvest. Shelterwood harvest units with an existing understory of young trees would continue to provide habitat for snowshoe hares and potential foraging habitat and areas of connectivity for lynx. With the removal of some overstory trees, an increase in future winter foraging habitat for lynx is anticipated within 15 – 20 years. Harvesting will increase understory vegetation and seedling regeneration in the first growing season following harvest, and accelerate the growth of existing young trees.

Shelterwood harvests and aspen rehabilitation treatments in both alternatives will reduce lynx denning habitat by 44.9 and 24.7 acres, respectively, with a total reduction in denning habitat of 69.6 acres. These treatments will change existing mature habitat structural stages with canopies greater than 40% (36.1 acres of 4B, 5.1 acres of 4C, and 28.4 acres of 5) to a 4A condition, reducing denning habitat in the Stewart Creek LAU by 1.01% and increasing other lynx habitat by 0.41%. Shelterwood and aspen rehabilitation treatments that reduce denning habitat will meet the definition of other lynx habitat specified in the Lynx Habitat Mapping Criteria (Grand Mesa, Uncompahgre and Gunnison National Forest 2001), which states that 4A structural stages of spruce-fir should be classified as other lynx habitat. Despite reductions in denning habitat, newly created 4A stands in spruce-fir dominated sites will eventually regenerate more seedlings and herbaceous forage for snowshoe hares and other lynx prey species than the more closed canopies in 4B, 4C, or 5 stands, with a change to winter foraging habitat expected within 20 years. This new foraging habitat would be adjacent to mature forest stands allowing lynx to hunt along edges next to hiding and escape cover.

Lynx require large physical structure in concentrated areas in the form of downed woody debris, also referred to as course woody debris. Course woody debris with vertical and horizontal structure in forested habitats provides habitat for natal dens, kitten protection, and resting cover (Ruggiero et al. 1994, Ruediger et al. 2000). In all of the proposed units, course woody debris, snags, snag replacement trees, large diameter old trees, upturned stumps and trees with visible wildlife use signs (including squirrel activity) would be maintained to minimize loss of these important habitat components.

Topographic features important for lynx movement include ridge systems, prominent saddles, riparian corridors, narrow forested mountain ridges, plateaus, and forest stringers that link more extensive areas of lynx habitat (Ruediger et al. 2000). Portions of several harvest units within the Perfecto Creek Timber Sale occur on ridges (units 5, 6, 11, 12, and 13). However, since proposed treatments will not reduce stands below a 4B structural stage for the majority of the project area or are not expected to be a barrier to movement due to their small size or the availability of adjacent cover, travel by lynx and habitat connectivity is likely to be unimpaired. Riparian areas would retain their vegetative cover and continue to serve as travel connections for wildlife. In addition, alternative 3 is designed specifically to maintain old growth forest stands and habitat connectivity.

Up to 6.6 miles of road reconstruction and 1.25 miles of temporary road construction are proposed in the Perfecto Creek Timber Sale project (6.6 and 0.8 miles respectively in alternative 3). No permanent loss of lynx habitat will take place from road reconstruction since reconstruction occurs only on existing roads. Temporary road construction will result in a temporary loss of habitat since all temporary roads will be obliterated and habitat will recover with re-growth of shrubs and young conifers. Harvest stands with temporary road construction will remain as 4B stands following treatment; in addition, regeneration in road obliteration areas within 4B stands will provide future habitat for snowshoe hares and potential foraging opportunities for lynx.

Approximately 3.2 miles of roads will be closed and 0.3 miles of existing roads will be obliterated within the timber sale project area. Road obliterations and closures will reduce recreational impacts in the area which should benefit lynx. Although lynx habitat quality, particularly in denning habitat, will be affected by temporary road construction, potential effects would be similar to those expected from forest openings created by group selection harvests. Daytime avoidance of temporary roads, harvest units, and logging haul routes by lynx will likely occur while these areas are open and active. At night when human activity is absent and after harvest activities are completed, lynx use of these areas would likely continue.

Road closure and obliteration totaling 3.5 miles that are currently open to motorized travel would benefit lynx. Road impacts such as human disturbance and access into lynx habitats would be reduced. Lynx use in mature forest habitats immediately adjacent to road corridors proposed for obliteration may increase. As obliterated roads re-vegetate, the regeneration of tree seedlings, shrubs, and herbaceous vegetation in the roadbeds would improve potential foraging habitat for snowshoe hare and lynx. Lynx may use decommissioned roadbeds for travel and foraging where vegetation provides good snowshoe hare habitat (Ruediger et al. 2000).

If proposed timber harvesting activities occur during the winter months, winter access to lynx habitat is unlikely to change for either humans or competing predators such as lions, coyotes, and bobcats. Access to proposed harvest units is by existing roads that receive

recurring use by snowmobilers resulting in compacted snow routes in most winters. Snow plowing to allow timber harvest would be along these same routes.

Protection measures for riparian areas, wetlands, and stream habitat that may be used by lynx (as foraging habitat or travel connections) or their prey species (including snowshoe hare) are incorporated into the design of the timber sale. Proposed harvest units are outside of riparian and aquatic habitats and have adequate vegetated buffers in between. No additional impacts on lynx and prey species that may use riparian or aquatic habitats are expected due to timber harvest activities.

Proposed timber cutting and associated activities of the Perfecto Creek Timber Sale are unlikely to affect the Canada lynx to the extent that an individual lynx or its home range (Lynx Analysis Unit) would be jeopardized. The proposed Perfecto Creek Timber Sale and its associated activities May Affect but are Not Likely to Adversely Affect the Canada Lynx. No other direct or indirect effects on lynx are anticipated. Please see the Biological Assessment for the Perfecto Creek Timber Sale, completed January 10, 2006, for additional information regarding the Canada lynx.

Sensitive Species –

American marten

The marten is a mink-sized member of the mustelid family with highly specialized habitat requirements in terms of coarse woody debris, closed over-stories, and interior old growth.

On the Grand Mesa, Uncompahgre and Gunnison National Forests martens are dependent on mature and old growth coniferous forests (Takats et al. 1999) associated with small openings and high elevation riparian habitat. The Forest currently supports approximately 600,925 acres of denning, resting and foraging habitat for marten (Table 18), encompassing approximately 18% of the land base of the Forest. Sixteen percent of the Forest is primary (moderate and high quality) denning, resting, and foraging habitat that is contiguous to other suitable habitat. Approximately 30,268 acres of primary habitat comprised of habitat patches greater than 37 acres in size (minimum size requirement for isolated habitat patches) is isolated from other suitable habitat. High quality habitat is composed of 4B, 4C, and 5 spruce-fir stands with greater than 50% canopy cover. Moderate quality habitat consists of lodgepole pine stands composed of 4B, 4C, or 5 structural stages with greater than 50% canopy cover. Low quality habitat includes 3B and 3C spruce-fir and lodgepole pine.

Table 18. Acreage distribution of marten habitat Forest-wide based on habitat parameters and habitat quality.

Habitat Parameter	Habitat Quality						Total
	Primary				Secondary		
	High	High Isolated	Moderate	Moderate Isolated	Low	Low Isolated	
Denning/ resting	252,644	16,604	85,269	4,478	21,242	523	380,760
Foraging	192,387	9,186	15,110	0	77	0	220,165
Total	445,311	25,790	100,379	4,478	21,319	523	600,925

Within the 6,870 acre Perfecto analysis area, denning/resting and foraging habitat for marten comprises 754 acres which is 10.98% of the analysis area and 0.13% of marten habitat on the Forest. Approximately 50.1% of marten habitat within the Perfecto analysis area is considered denning/resting habitat, and 49.9% is considered foraging habitat. Table 19 depicts marten habitat distribution within the Perfecto analysis area based on habitat quality.

Table 19. Acreage distribution of marten habitat within the 6,870 acre Perfecto analysis area based on habitat parameters and habitat quality.

Habitat Parameter	Habitat Quality			Total	% of marten habitat w/in analysis area[1]	% of marten habitat on the Forest[2]
	Primary		Secondary			
	High	Moderate	Low			
Denning/ resting	310	--	68	378	50.1	0.0629
Foraging	241	135	--	376	49.9	0.0626
Total	551	135	68	754	100	0.13

[1] (**Total** column / 754 x 100); [2] (**Total** column / 600,925 x 100)

Areas of connectivity occur between the above marten habitat types within the Perfecto analysis area, comprised of spruce-fir and lodgepole pine that do not meet the habitat criteria of denning/resting and foraging habitat. These areas provide adequate cover to support dispersing martens and movements between denning/resting and foraging habitats. Areas of connectivity comprise early successional stages (3A-3C) intermixed with mature stands of spruce-fir and lodgepole pine, encompassing approximately 3,479 acres within the Perfecto analysis area (Table 20). Overall marten habitat (Denning/resting, foraging, and connectivity) comprises 62% of the Perfecto analysis area.

Table 20. Acreage distribution of habitat providing connectivity between denning/resting and foraging habitat for marten within the Perfecto analysis area.

Cover Type	3A	3B	4A	4B	4C	5	Total
Spruce-fir	394	1,131	664	631	118	518	3,456
Lodgepole	--	23	--	--	--	--	23
Total	394	1,154	664	631	118	518	3,479

Survey protocols used for marten on the Forest include snowtracking, sooted track plates, and photographic bait stations based on methodologies described by Zielinski and Kucera (1995). Thirty marten territories are estimated to occur on the Forest. Territory identification is based on known marten distribution across the Forest. Less than 1% of suitable marten habitat has been surveyed on the Forest; therefore the number of documented territories may be substantially less than actual number of territories existing on the Forest.

Within the Perfecto analysis area a total of three marten detections occurred during the field seasons of 2003 – 2005, encompassing at least one territory (Maximum distance

between detections was 0.9 miles). This territory was identified based on three adult marten detections, two which were documented with tracks and photographs and one that was observed during a site visit. During the field seasons of 2003 and 2004, a total of 24 track plate stations and five photographic bait stations spaced 0.5 miles apart were placed within spruce-fir stands throughout the Perfecto project area. One marten was detected in a stand containing high quality denning/resting habitat totaling 85 acres. This stand was originally scheduled for treatment under the proposed action for the Perfecto Timber Sale. The treatment planned for this stand was subsequently dropped from consideration. No harvest activities will occur within this stand and proposed treatments will not take place within 0.28 miles of the detection location.

The change in structural stage (SS) in spruce-fir habitat from 5 and 4C to 4B (450 acres in alt. 2; 306 acres in alt. 3) is not expected to significantly impact marten because this change will not result in a loss of marten habitat. Marten that are currently using these stands are expected to continue using this habitat following treatment activities. However, reductions in canopy cover and tree density may impact marten in terms of reduced habitat quality. This is reflected by a slight decrease of 0.03 and 0.02 in habitat capability value in alternatives 2 and 3, respectively, when compared to current conditions (Table 13). Maintenance of adequate large down wood, coarse woody debris, snags and wildlife trees will act to maintain the structural diversity that provides marten denning sites. Group selection openings are not expected to exceed 0.25 acres in size. Multi-storied and multi-aged spruce-fir habitats that would result from group selection treatments provide a variety of habitat components for a wide range of wildlife species, providing foraging opportunities for marten. Adequate mature habitats will remain within the project area (at least 56% of forested habitat) and in the residual stand between groups in group selection units to provide adequate habitat for marten and connectivity to mature habitats within and adjacent to the analysis area.

Proposed aspen rehabilitation treatments (40 acres in alt. 2; 107 acres in alt. 3) could eliminate coniferous cover for marten if marten are using these stands. Aspen rehabilitation treatments will result in a change in cover type from spruce-fir to aspen for approximately 36.2 and 94.8 acres in alternatives 2 and 3, respectively. The remaining acres within aspen rehabilitation treatment units are currently classified as aspen cover types. As aspen dominated stands are not considered potential habitat for marten, the primary effect resulting from the cover type change will be a slight decrease in marten habitat (Denning/resting, foraging, and connectivity) within the analysis area from 62% to 61.5% (alternative 2) and 60.6% (alternative 3). These units could provide connectivity and potential foraging habitat along the conifer-aspen interface for marten as the vegetative response to treatments is expected to lead to the establishment of an early successional stand providing habitat for small birds and mammals and other potential prey species for marten. As these stands mature, they may become more suitable for marten in terms of habitat connectivity. Existing logging debris piles away from roads and piles of logs, stumps, or other woody debris in all treatment units will be left to provide potential denning sites, minimize the effects of larger openings, and to provide connectivity to adjacent stands. The closure and obliteration of currently open and

proposed temporary roads will benefit marten by limiting human presence and stimulating re-vegetation, providing new habitat for prey species.

These impacts to marten are not expected to have any long-term effect on the existing marten population within the project area. Impacts to marten are more likely to result in a temporary decline in marten activity within and a partial shift in habitat use away from the area of proposed activities. An increase in potential foraging habitat over time is likely to have a positive effect on reproductive success that could eventually lead to an expansion of the existing population into adjacent suitable habitats. The impact to marten habitat across the GMUG National Forest is minimal. The affected acres of suitable marten habitat (910 acres in alt. 2; 780 acres in alt. 3) represent 0.15% and 0.13% of potentially suitable habitat available to marten on the GMUG N.F.

Direct effects include displacement of martens during timber harvest activities. Indirect effects include a reduction in habitat quality due to decreased canopy closure and tree density, and an increase in small openings. Foraging opportunities are anticipated to increase as regeneration occurs in small openings. There is a potential for a temporary decline in marten activity within harvest units and a partial shift in habitat use away from the area of proposed activities. The proposed activities associated with the Perfecto Creek Timber Sale may impact individuals, but are not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

Northern goshawk

Preferred habitat on the Grand Mesa, Uncompahgre and Gunnison National Forests appears to be large blocks of mature and old growth aspen, mixed forest co-dominated by aspen and spruce-fir, spruce-fir with remnant open crowned aspen trees, lodgepole pine, or ponderosa pine. Nesting and post fledgling habitat areas are most dependent upon large un-fragmented blocks of mature or old growth forest. Nest site selection occurs in mature to old growth forests that contain a narrow range of vegetation structural conditions (Shuster 1980, Hayward and Escano 1989, Reynolds et al. 1992, Squires and Reynolds 1997, Schaffer et al. 1999). These structural conditions include open understories and a relatively closed canopy (60-90%) with large trees of moderate density (Speiser and Bosakowski 1987, Kennedy 1989, Reynolds et al. 1992, Daw et al. 1998, Bosakowski 1999).

The GMUG National Forest currently supports approximately 1,071,432 acres of nesting habitat (Figure 3A) and 1,951,379 acres of foraging habitat for goshawk (Table 21), encompassing approximately 32% and 59% of the land base of the Forest. The majority of nesting habitat is considered high-quality (Figure 3B), and contains the greatest potential of supporting nesting goshawks. Refer to the GMUG National Forest MIS Assessment (USDA Forest Service 2005) for descriptions of goshawk nesting and foraging habitat criteria.

Figure 3. Acreage distribution of goshawk nesting habitat on the GMUG National Forest by cover type, habitat structural stage, and habitat quality.

A. Distribution of goshawk nesting habitat, Forest-wide

Cover Type	Habitat Structural Stage 4B	4C	Total
Aspen	225,209	175,582	400,791
Douglas fir	15,526	6,431	21,958
Lodgepole	48,706	38,714	87,420
Ponderosa	43,411	965	44,376
Spruce-fir	317,130	199,757	516,888
Total	649,982	421,450	1,071,432

B. Distribution of goshawk nesting habitat quality

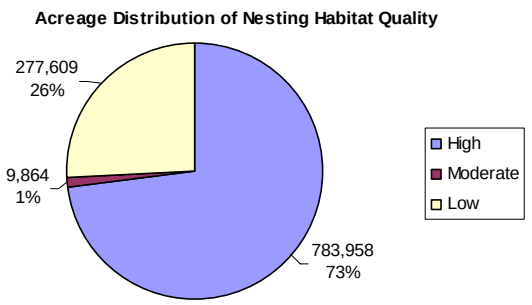

Table 21. Acreage distribution of goshawk foraging habitat, GMUG National Forest

Cover Type	Habitat Structural Stage: No HSS data[1,2]	1[2]	2[2]	3A	3B	3C	4A	4B	4C	Total
Forbland		9								9
Grassland		8								8
Rush spp./wet sedge spp.		1								1
Bare soil, rock	2									2
Gambeloak			1							1
Shrubland			1							1
Willow			1							1
Aspen				55,009	210,371	41,376	23,537	227,083	176,277	733,652
Bristlecone				2,253	1,607	45	2,081	1,347		7,333
Blue spruce				100	213	560	117	597	836	2,422
Cottonwood				190	57		1,844	1,276	42	3,408
Douglas fir				2,892	7,931	2,416	8,826	16,181	6,580	44,826
Limber pine							23	530	33	585
Lodgepole			0.42	6,174	105,515	54,175	4,650	49,435	38,875	258,824
Pinyon-juniper				12,518	15,610	452	11,264	10,706	1,168	51,718
Ponderosa				10,262	12,794	94	42,055	44,084	965	110,253
Spruce-fir				37,155	93,385	10,988	72,783	322,568	201,388	738,266
Water	61	4	0.27							66
Total	63	22	4	126,551	447,484	110,105	167,180	673,806	426,163	**1,951,379**

[1] Habitat structural stage not designated.

[2] Openings within forested areas are only considered foraging habitat if they are less than or equal to one acre in size.

Within the 6,870 acre Perfecto analysis area, goshawk nesting and foraging habitat comprises 4,728 acres which is 68.8% of the analysis area and 0.24% of goshawk habitat on the Forest. Approximately 14.3% of goshawk habitat within the Perfecto analysis area is considered nesting habitat, and 68.8% is considered foraging habitat (goshawk foraging and nesting habitat overlap). Table 22 reflects goshawk habitat distribution within the Perfecto analysis area.

Table 22. Acreage distribution of goshawk nesting and foraging habitat within the 6,870 acre Perfecto analysis area

Cover Type	Nesting 4B	4C	5	Total Nesting	Foraging 3A	3B	4A	4B	4C	5	Total Foraging
Spruce-fir	676	162	145	967	748	1,560	538	213	187	616	3,862
Aspen					251	564	29				844
Lodgepole						23					23
Total	676	162	145	**983**	999	2,147	567	213	187	616	**4,729**

Goshawk nest monitoring and broadcast surveys are conducted on the Forest using inventory protocols established by Kennedy and Stahlecker (1993), Joy et al. (1994), Bosakowski (1999) and Kennedy (2003). These surveys have provided the majority of information on the activities, numbers, and distribution of goshawks on the Forest. Forest-wide there are an estimated 37 goshawk territories and 254 reported goshawk observations over the last 20 years. Fifty-six percent (n = 142) of those observations occurred within one mile of known goshawk nest sites and the majority of those observations were associated with active nests. Not all suitable goshawk habitat has been surveyed (areas not inventoried include wilderness areas), thus goshawk observations and estimated territories represent only a portion of goshawk habitat on the Forest. Refer to the GMUG National Forest MIS Assessment (USDA Forest Service 2005) for a more detailed analysis of goshawk population and distribution information for the GMUG National Forest.

Goshawk surveys conducted from 1994 – 1995, 1999 – 2000, and in 2002 resulted in a total of 167 broadcast calling stations distributed 300 m apart throughout the 6,870 acre Perfecto analysis area. We broadcasted two types of conspecific calls (adult alarm call, and the juvenile food begging call) which have been shown to be effective in eliciting goshawk responses (Kennedy and Stahlecker 1993, Kimmel and Yahner 1990). No goshawks were detected from these surveys and no nests were found. Forested habitats within the analysis area are primarily spruce-fir (87%). Although goshawks use spruce-fir forests for foraging, there have been no goshawk nests found in an Engelmann spruce or subalpine fir tree on the Grand Mesa, Uncompahgre and Gunnison National Forests. Aspen comprises 12% of the Perfecto analysis area but occurs mainly adjacent to large parklands. In addition, early successional stages (3A-3B) of aspen comprise the majority of aspen (92%) within the analysis area.

Mature aspen appears to be highly desirable to goshawks in the Gunnison Basin as both nesting and foraging habitat. When compared to dense spruce-fir stands, prey availability is higher in mature aspen stands because the open understory characteristic of mature aspen facilitates easier access to prey by goshawks. Both alternatives, particularly alternative 3, emphasize the regeneration and retention of aspen through aspen rehabilitation treatments. Reynolds et al. (1992) encourages aspen and seral tree species regeneration because aspen is desirable for woodpeckers and other goshawk prey species. These treatments, in conjunction with group selection treatments in spruce-fir stands, are expected to increase forest age-class and plant diversity within the project area, which will benefit goshawks in the long-term by providing habitat that benefits a variety of prey species. Group selection treatments will create irregular-shaped small openings no greater than 0.25 acres in size. Small openings minimize the detrimental effects of opening the forest on red squirrel food and habitat (Reynolds et al. 1992), maintaining red squirrels as a prey item for foraging goshawks. In addition, the improvement of aspen stands that currently do not form high quality goshawk nesting and foraging habitat will accelerate the development and ensure the persistence of healthy aspen stands in the future for goshawks and their prey species, ensuring the long term persistence of potential goshawk habitat in the Perfecto analysis area.

Because goshawk nest stands are generally found in sites with 50-70% or higher canopy closure, harvest units resulting in a 4B classification (41-70% closure) may or may not provide suitable potential nesting habitat, depending on the overstory conditions following treatments. While these stands will maintain the structural characteristics of a mature stand, the reduction in overstory density and canopy closures could impact potential goshawk nesting habitat until overstories fill in and canopy closures are 50% or greater. Group selection treatments will change SS5 and 4C to a 4B condition in spruce-fir habitats, encompassing 375 acres in alternative 2 and 248.5 acres in alternative 3. Shelterwood treatments will reduce 49.5 acres of SS5 and 4B spruce-fir to a 4A condition in both alternatives. Reynolds et al. (1992) describes group selection and shelterwood regeneration methods as appropriate in both post-fledging family areas and foraging areas, provided that openings are small and irregular-shaped and reserve trees are maintained. Since goshawk nests in the Gunnison Basin have been documented primarily in aspen and lodgepole pine habitats, reductions in overstory densities in spruce-fir habitats is not expected to negatively impact goshawks during the breeding season. The primary effect will be the reduction in overstories and a reduction in the quality of habitat for wintering goshawks. At this time it is not known if goshawks winter within the project area. However, several factors suggest that the Perfecto analysis area may not be utilized as wintering habitat:

1. The literature suggests that goshawks winter either on their breeding home ranges (mixed conifer and ponderosa) or at lower elevation sites that do not resemble breeding habitats (pinyon-juniper) (Squires and Ruggiero 1995, Drennan 2003).

2. Goshawks have not been documented during the breeding season in the Perfecto analysis area.

3. Proposed harvest activities will occur at higher elevations than commonly observed at most other known nest locations of goshawks on the Forest (see GMUG National Forest 2005 MIS Assessment, USDA Forest Service 2005). Information on goshawk habitat use during winter is limited in the literature, but the available literature reported the highest elevation of documented winter occurrence in Colorado at 9,711feet (Range: 8,497-9,711), with one documented occurrence at 10,000 feet in November (Squires and Ruggiero 1995). Proposed treatments will occur at elevations ranging from 10,500 – 11,560 feet.

Despite the above factors, the potential exists for goshawks to use the Perfecto analysis area during winter since suitable winter habitat, based on forest structure and composition, is present in the area. SS4C or 5 (old growth) stands that remain throughout the project area and the residual stand in group selection treatments will still provide potential goshawk winter habitat. Forest stands that result in SS4B following treatment will continue to provide suitable goshawk foraging habitat after harvest. Although small openings up to 0.25 acres in size would be dispersed within 4B stands, the large tree component and interlocking crowns would be maintained in adjacent forested stands and

between openings, providing red squirrel habitat. Small, scattered openings throughout potential goshawk foraging habitat may help develop an interspersion of structural stages that is beneficial to goshawk prey species (Reynolds et al. 1992). Opening up the overstory in these stands is expected to stimulate ground vegetation growth over the long-term that will attract a variety of small mammals and birds that goshawks hunt. The Perfecto analysis area contains a mosaic of structural stages with the majority of forest stands in a mature (43%) to old growth (13%) condition. These mature and old growth stands (a minimum of 56% of the forested habitat within the analysis area) enables the Perfecto analysis area to provide potential habitat to support breeding and/or foraging goshawks. Furthermore, aspen rehabilitation treatments may provide future nesting habitat when these stands reach maturity, especially where aspen inclusions extend to higher elevations within spruce-fir.

Goshawks are sensitive to human disturbance and have abandoned nests and young due to human activities that take place too close to their nest. Since proposed activities will not occur within two miles of identified or potential goshawk nest stands, territories, or Post Fledgling Areas (PFA), no disturbance impacts are anticipated. No change in goshawk population status or trend is anticipated. When comparing affected goshawk habitat within the Perfecto analysis area to the total potential available goshawk habitat forest-wide, the impact to goshawk habitat is negligible. The affected acres (910 acres in alt. 2; 780 acres in alt. 3) represent 0.05% and 0.04% of potentially suitable habitat available to northern goshawks on the GMUG N.F.

Direct effects include displacement of goshawks if any are present in the area when timber harvest activities take place. Indirect effects include a reduction in the quality of goshawk winter habitat due to decreased canopy closure and an increase in small openings. However, reductions in canopy closure resulting from small openings may increase habitat for small mammals, potentially increasing foraging opportunities for goshawks. The proposed activities associated with the Perfecto Creek Timber Sale may impact individuals, but are not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

Wolverine

Unlike other species where habitat alteration and prey base reduction would impact their existence, the wolverine is better able to tolerate these impacts. Their large home range size and geographic isolation make it difficult for one project to impact a population although an accumulation of developments may create a negative impact. The wolverine is an inhabitant of remote wilderness areas where development is unlikely to occur. Although they probably follow their prey to lower winter elevations, their large home range and diversity in diet allow them to avoid human conflicts. Wolverines consume such a large diversity of prey species that a reduction in one species would create a shift to a more abundant prey source.

A change in habitat structural stage from 5 (Old growth) and 4C to 4B is not expected to impact wolverine. Maintenance of adequate large down wood, coarse woody debris, and snags and wildlife trees will act to maintain the structural diversity that provides

wolverine denning sites. Multi-storied and multi-aged spruce-fir habitats that would result from group selection treatments provide a variety of habitat components for a wide range of wildlife species providing foraging opportunities for wolverine. Adequate mature habitats will remain within the analysis area (at least 56% of forested habitat) to provide connectivity to mature habitats in adjacent areas. Proposed aspen rehabilitation treatments within spruce-fir stands will reduce cover for wolverines. These units will still provide foraging habitat for wolverine as the increased vegetative response to the open conditions and eventual establishment of an early successional stand provide habitat for big game species, snowshoe hare, and other potential prey species for wolverine. Wolverines require large physical structure provided by down woody debris on forested habitat for natal dens, kit protection, and resting cover (Ruggiero et al. 1994). Existing debris piles away from roads and piles of logs, stumps, or other woody debris in all harvest units will be left to provide potential denning sites, minimize the effects of large openings, and to provide connectivity to adjacent stands. The closure and obliteration of currently open and temporary roads will benefit wolverine by limiting human presence and stimulating re-vegetation to provide new habitat for prey species. Forest carnivore surveys based on methodologies described by Zielinski and Kucera (1995) were conducted in the Perfecto analysis area from 2003 to 2004, with no wolverines detected. There are no known, documented occurrences of wolverine within the Perfecto analysis area. No impacts on wolverine are anticipated from the proposed Perfecto Creek Timber Sale.

Pygmy shrew

In Colorado, pygmy shrews occupy damp sub-alpine spruce-fir and lodgepole pine forests, sphagnum bogs, fens, moist meadows and other high elevation wetlands. Their habitat may also include clear-cut and selectively logged forests, forest-meadow edges, willow thickets, aspen-fir forests, and subalpine parklands (DeMott and Lindsey 1975, Pettus and Lechleitner 1963, Spencer and Pettus 1966, Vaughan 1969, Fitzgerald et al. 1994). They build runways under stumps, fallen logs, and litter, and they may also build nests under these materials (Fitzgerald et al. 1994).

Moist areas within coniferous forests provide important microhabitats for pygmy shrews. Moist sites are generally avoided by timber harvest activities. Protection measures for riparian areas, wetlands, and stream habitat are incorporated into the design of the timber sale. Proposed harvest units are outside of riparian and aquatic habitats and will be laid out to avoid wet areas when encountered, with vegetated buffers maintained in between. Project design to avoid wet areas and seeps within harvest units and to maintain large down logs and coarse woody debris within units is intended to maintain forest floor moisture and habitat for pygmy shrew. Proposed aspen rehabilitation treatments will affect forest floor moisture in that more direct sunlight will reach the forest floor creating dryer conditions, which could impact pygmy shrews if they are present. In contrast, small 0.25-openings created from group selection treatments may increase small mammal and insect activity within these areas if there is an increase in herbaceous vegetation, which could result in an increase in small mammal and insect burrows used by pygmy shrews. If wet areas are avoided and course woody debris (minimum of 10 – 20 tons per acre) maintained within treatment units, there is a limited potential to impact pygmy

shrews. Decayed course woody debris may retain moisture for long periods and could potentially be used by pygmy shrews within treatment units. If pygmy shrews are present in these areas when harvest activities take place, direct effects include a temporary displacement. However, since project activities should avoid wet areas that are indicative of pygmy shrew habitat as described above, direct effects such as displacement and disturbance from mechanical equipment, are not expected. There are no known, documented occurrences of pygmy shrew within the Perfecto analysis area. If pygmy shrews are present, the proposed Perfecto Creek Timber Sale may impact individuals, but is not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

Boreal owl

This year-round resident inhabits coniferous woodlands, including mature Engelmann spruce-subalpine fir or spruce-fir/lodgepole pine forests interspersed with meadows. This species is a secondary cavity nester that utilizes old woodpecker holes or natural cavities.

A change in structural stage 5 and 4C to 4B in spruce-fir habitats in group-selection units, and a change of 4C and 4B to 4A in aspen rehabilitation units may reduce habitat quality for boreal owls due to reductions in canopy cover. Maintenance of mature forest habitat (4B), the expected increase in small openings, maintenance of existing snags and downed logs, and increased stand vigor should improve foraging and future nesting opportunities. Some decline in quality of roosting habitat may be expected with reduced tree densities although canopy closure at roost sites in Canada averaged 44% (Palmer 1986) and in Idaho averaged 58% at winter roosts and 63% at summer roosts (Hayward et al. 1993). Canopy closures in 4B stands will range from 40 – 70%. The residual stand between harvested groups in group selection units and structural stage 5 and 4C stands of suitable habitat throughout the Perfecto analysis area (a minimum of 38.4% of forested habitats within the project area) will remain as 5, 4C, and 4B, providing suitable roosting habitat. Shelterwood harvests will affect approximately 49.6 acres of preferred boreal owl habitat, reducing 28.4 acres of structural stage 5 to 4A and 21.2 acres of 4B to 4A. Created 4A stands will likely not be suitable for boreal owls in terms of roosting and nesting, but may provide foraging opportunities if there is an increase in herbaceous vegetation and subsequent increased small mammal activity following harvest.

Aspen rehabilitation treatments, especially where units include inclusions within spruce-fir stands, are expected to provide increased early and late season foraging opportunities when herbaceous vegetation is less dense allowing greater access to prey. A decreased understory may also increase prey availability by facilitating easier access. Prey species richness may increase in response to increased herbaceous vegetation during summer months. In alternative 3, aspen rehabilitation treatments will change 79.4 acres of spruce-fir dominated habitat to an aspen cover type, reducing approximately 74.3 acres of 4B to 4A, and 5.1 acres of 4C to 4A. In alternative 2, aspen rehabilitation treatments will change 24.7 acres of spruce-fir dominated habitat to an aspen cover type, reducing approximately 19.6 acres of 4B to 4A, and 5.1 acres of 4C to 4A.

Boreal owls tolerate human and machine noise (Hayward and Verner 1994), thus proposed activities, implemented with mitigation to protect any territories or nest sites found during operations, are not expected to displace boreal owls unless roosting individuals are disturbed. Although suitable habitat exists in the Perfecto project area, no documented occurrences of boreal owl are known. The proposed Perfecto Creek Timber Sale may impact individuals, but is not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

American three-toed woodpecker
In Colorado, this species is restricted to the western half of the state, being rare or locally uncommon in the higher mountains and rare in the lower mountains. It is most common in years and areas where trees have high insect populations due to disease or fire. This woodpecker inhabits primarily spruce-fir forest. This species is a primary cavity nester.

Occurrences of three-toed woodpecker have been documented within the Perfecto analysis area. Neotropical migrant bird surveys were conducted using a modification of a habitat-based point-count protocol (Huff et al. 2000). Surveys took place from May to June during 2003, 2004, and 2005, consisting of transects representing three different habitat types: spruce-fir, willow riparian and open parkland. In 2003, one three-toed woodpecker was detected in mature spruce-fir. There were four detections in 2004; two occurred on two different points on the spruce-fir transect, and two occurred on two different points on the riparian transect. In 2005, two detections occurred on one point on the riparian transect.

Snag inventories were also conducted throughout the Perfecto analysis area in the fall of 2002, following a snag inventory protocol developed by Bate et al. (1999). The objective was to determine if estimated snag density met, or exceeded, targeted densities listed in the Forest Plan. In addition, a distribution index was applied to determine if snags were distributed evenly enough across the landscape to meet the habitat needs of territorial cavity nesters. Based on survey results, the estimated density of snags (> 10 inches DBH and at least 6 ft tall) within the Perfecto analysis area was 9.761 snags per acre, which significantly (99% confidence interval; t-value = 2.66) exceeded specified target densities (5 snags per acre). The distribution index (DI) was 1.69, indicating that snags were distributed evenly enough across the landscape to meet the habitat needs of territorial cavity nesters (DI of less than 1.0 indicates that there are large areas with few or no snags present). Survey results indicated that snags of appropriate size, abundance, and distribution were adequate to meet woodpecker habitat requirements under the existing condition.

The existing condition (Alternative 1) provides the greatest amount of habitat for this species. Small population irruptions of this species will continue in response to tree mortality from drought, overstocked stands, and increases in disease and insect activity throughout the analysis area. Populations are expected to show a gradual increase over time corresponding with increased mortality in the overstory.

All action Alternatives (2-3) will impact habitat for three-toed woodpeckers. See Table 13 for changes in habitat capability values. The major impacts will occur with the reduction of densities primarily in spruce-fir. The expected resultant improvement in overstory health within the treatment units will diminish the potential for small population irruptions over time in response to insect outbreaks. A subsequent decline in insect activity following harvest may cause a population decline of three-toed woodpeckers. If reductions in bark beetles occur, individuals are expected to relocate to areas with higher insect abundance. Some level of maintenance will occur as recruitment of new dead occurs from natural processes. However, recruitment of new dead may be slight and maintenance levels of three-toed woodpeckers will be below what could have been with the existing condition. Uneven-age treatments (group and individual tree selection) account for 89 and 78 percent of the proposed treatments for Alternatives 2 and 3, respectively. By proposing primarily uneven-age treatments, the Perfecto Creek Timber Sale attempts to avoid even-aged stand structure (e.g., by leaving patches of mature/old growth trees) which would benefit three-toed woodpecker populations. Uneven-aged stands would allow for better retention of snags and old-growth trees as foraging and nesting habitat and may also hinder the spread and intensity of spruce beetle attacks (Wiggins 2004), accomplishing both timber stand improvement and wildlife habitat maintenance goals.

Proposed activities that reduce tree densities in mature spruce-fir habitats could impact potential nesting habitat for the three-toed woodpecker. While these stands will maintain the structural characteristics of a mature stand (SS4B), the reduction in overstory density and canopy closures could impact three-toed woodpecker nest success until overstories fill in and canopy closures are 50% or greater and/or these stands recover to SS4C or 5 (20-30 years). Zapisocki et al. 2000 suggests canopy closures of 50% or greater are optimum for three-toed woodpeckers. A decrease in the habitat capability index value (see table 13) in all action alternatives for three-toed woodpecker reflects a change in spruce-fir stands from SS5 and 4C to 4B. Since HCI values for three-toed woodpecker do not meet minimum standards, selection of alternative 2 would require a non-significant Forest Plan Amendment in order to meet the requirements of the National Forest Management Act. The residual stand between harvested groups in group selection units and SS5 and 4C stands of suitable habitat throughout the project area (a minimum of 17% of the forested portion of the analysis area will remain as SS 5 and 4C) will maintain suitable habitat for three toed woodpecker. SS4B stands will continue to provide habitat for three-toed woodpeckers although habitat quality may be somewhat reduced. Mature forest habitats (SS 4A, 4B, 4C, 5) will account for a minimum after treatment of 56% of forested habitats and at least 39% of suitable habitat (spruce-fir > 40% canopy cover) within the analysis area for this species. Design criteria to provide snags and wildlife trees within treated units will maintain potential nesting and foraging sites within and adjacent to proposed treatment units. Project activities could directly impact individual three-toed woodpeckers by causing displacement; indirect effects include loss of potential foraging habitat and degradation of nesting habitat quality. The proposed Perfecto Creek Timber Sale may impact individuals, but is not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

Olive-sided flycatcher
Within coniferous forests, this bird is associated with forest/meadow edge habitat, where it hunts insects from perches on top of tall dead trees or live trees with dead tops. This bird appears to respond positively to timber management practices that provide small openings adjacent to mature forest with adequate large snags or dead topped trees.

Suitable habitat exists within the Perfecto analysis area. In addition, there were documented occurrences of olive-sided flycatchers within the analysis area during point-count bird surveys. Neotropical migrant bird surveys were conducted using a modification of a habitat-based point-count protocol (Huff et al. 2000). Surveys took place from May to June during 2003, 2004, and 2005, consisting of transects representing three different habitat types: spruce-fir, willow riparian and open parkland. Two Olive-sided flycatchers were detected in 2004; one was detected in spruce-fir and the other was detected in riparian habitat. Proposed group selection and shelterwood treatments should enhance habitat for olive-sided flycatcher, especially where large snags and dead topped trees are retained adjacent to or within openings. Numerous authors have noted a positive response by olive-sided flycatcher to timber management (Hager 1960, Evans & Finch 1993, Medin & Booth 1989, Medin, Medin 1985, and Franzreb & Ohmart 1978). Configuration of openings, adjacency to mature forest, retention of snags and residual trees, and a relatively open canopy within mature stands are important factors influencing a positive response. Proposed harvest activities resource protection measures will provide each of the above factors. Group selection and shelterwood treatments will provide a variety of openings, most of which will be adjacent to mature forest. Project design criteria to provide snags and wildlife trees within harvest units will provide potential perch and foraging sites. Proposed activities are expected to have a beneficial impact on olive-sided flycatcher. Enhanced habitat conditions for this species may result in increased population numbers or increased use of the Perfecto analysis area.

Purple martin
In Colorado, the purple martin is closely associated with the geographic range of climax aspen forests. Nesting occurs near the edges of old-growth aspen stands, usually near streams, springs, ponds, wetlands, parks or meadows. Reynolds et al. (2002) characterized martin nesting habitat in west-central Colorado as mature (>60 years old) aspen stands on gentle slopes adjacent to large forest openings. The purple martin is a secondary cavity nester using woodpecker cavities or natural cavities in tree trunks, primarily in live aspen.

Although suitable habitat exists, there are no known, documented occurrences of purple martin within the Perfecto analysis area. Neotropical migrant bird surveys were conducted using a modification of a habitat-based point-count protocol (Huff et al. 2000). These point-count bird surveys (conducted from 2003 to 2005) and general species surveys since 1994 have not resulted in any sightings of purple martin. At least 589 acres of aspen habitat occurs within the Perfecto analysis area, of which 47.6 acres are classified as mature (SS 4A and 4B) and may be potentially suitable for purple martins. Many of these stands are near riparian areas and perennial streams (Perfecto and Chavez

Creeks) or adjacent to large open areas. Proposed activities are not expected to impact existing stands of mature aspen.

Units prescribed for aspen rehabilitation to reestablish aspen dominance in mixed conifer-aspen stands may provide future habitat for purple martins. The treatment proposes conifer removal; aspen will be cut only as needed for access or safety. Aspen inclusions within other proposed units are to be retained. All proposed aspen rehabilitation treatments benefit the maintenance and enhancement of existing aspen clones. There is a need to implement actions designed to promote aspen regeneration because there is some indication that aspen recruitment is low, primarily due to a lack of disturbance (Wiggins 2005). The general rule of fire suppression on public lands has likely had a negative impact on purple martins by reducing the generation of new (post-disturbance) aspen stands, and by allowing encroachment of conifers into the open habitats preferred by foraging martins (Wiggins 2005). Proposed aspen rehabilitation treatments address these factors and are intended to maintain aspen persistence over the long term in the Perfecto analysis area, potentially benefiting species such as the purple martin. No impacts on purple martin are anticipated from the proposed Perfecto Creek Timber Sale.

Brewer's sparrow

The distribution of the Brewer's sparrow is largely determined by the distribution of sagebrush (Holmes and Johnson 2005). The GMUG National Forest in well within the distribution range of the Brewer's sparrow. They breed regularly within sagebrush shrubsteppe habitats and less commonly in mountain shrub habitats on the Forest and throughout western, central, and eastern portions of Colorado.

The Brewer's sparrow is considered an obligate of sagebrush communities (Braun et al. 1976, Paige and Ritter 1999, Holmes and Johnson 2005). Throughout most of its breeding range, the Brewer's sparrow is most closely associated with landscapes dominated by big sagebrush (Weins and Rotenberry 1981, Rotenberry et al. 1999), which is also evident on the GMUG National Forest. Factors that influence Brewer's sparrow occupancy and abundance include the amount of sagebrush cover, sagebrush patch size, spatial distribution of patches, and the extent of disturbance and fragmentation. Table 23 reflects habitat characteristics for Brewer's sparrow detections on the Forest. Although a greater proportion of detections occurred in the grassland cover type (41% of all detections), it is important to note that shrubs were a habitat component within this cover type (shrub cover % ranged from 14 – 40%) and was likely an important factor influencing Brewer's sparrow occupancy of this habitat type.

Table 23. Vegetation cover type, habitat structural stage, and landscape-level habitat characteristics for Brewer's sparrow detections on the Forest. Brewer's sparrows were detected by the Rocky Mountain Bird Observatory on point-count bird transects conducted from 1998 to 2004.

No. of detections by cover type and habitat structural stage (HSS)				Landscape-level habitat characteristics							
Cover Type	1M	2S	No data	Shrub Cover % Range	Mean Shrub Cover %	Slope % Range	Mean Slope %	Elevation Range (ft)	Mean Elevation	Patch Size Range (ac)	Mean Patch Size (ac)
Forb-land	3 (4%)			9-20	13	18-34	23	11,365-12,013	11,581	28-67	54
Grass-land	34 (41%)			14-40	26	11-83	20	7,757-12,094	9,506	14-962	460
Bare soil/rock	1 (1%)		2 (2%)	5-10	7	28-46	40	11,658-11,981	11,873	33-47	38

Gambel-oak		4 (5%)		60-62	61.5	13-24	16	7,918-7,935	7,931	37-67	45
Sagebrush		22 (27%)		40-50	40.45	14-26	15	8,739-8,853	8,848	495-856	839
Willow		7 (9%)		50-60	56	22-36	24	11,744-11,919	11,843	28-153	89
No data			9 (11%)								
Total:	38	33	11	5-62	34	11-83	20	7,757-12,094	9,628	14-962	482

On the Forest, Brewer's sparrow habitat is widely distributed but occurs in small, often isolated habitat patches. Primary habitat includes areas dominated by big sagebrush (*Artemisia tridentata spp.*), encompassing approximately 40,457 acres. Secondary habitat consists of approximately 40,711 acres and is comprised of mountain shrub (willow, mountain mahogany, snowberry, or other woody shrublands other than sagebrush), sagebrush transition areas, and pinyon-juniper woodlands containing large meadows with a shrubby component. Brewer's sparrows are most abundant in ecologically healthy shrub communities consisting of tall shrubs in a clumped distribution.

Brewer's sparrows have been documented within the Perfecto analysis area. Neotropical migrant bird surveys were conducted using a modification of a habitat-based point-count protocol (Huff et al. 2000). Surveys took place from May to June during 2003, 2004, and 2005, consisting of transects representing three different habitat types: spruce-fir, willow riparian and open parkland. In 2003, one Brewer's sparrow was detected in open parkland habitat consisting of grass and shrub (shrubby cinquefoil) vegetation. In 2004, five Brewer's sparrows were detected in riparian habitat consisting of willow vegetation.

Brewer's sparrow population viability is likely linked to extensive alteration of sagebrush shrubsteppe habitat (Holmes and Johnson 2005). On the Forest, threats to Brewer's sparrows may be associated with management activities such as prescribed fire or mechanical treatment when design criteria are not implemented to ensure the maintenance of Brewer's sparrow habitat. Specifically, management activities that result in sagebrush reduction or the loss of other woody shrubs used by Brewer's sparrows may degrade breeding habitat. The proposed activities will not occur in nor impact potential Brewer's sparrow habitat within the Perfecto analysis area. Since all timber sale activities would occur in forested habitats not utilized by Brewer's sparrows, no impacts on Brewer's sparrow are anticipated.

Boreal toad

Boreal toads breed at high elevation wetland habitats, then migrate to adjacent nonbreeding grounds in spruce-fir, lodgepole pine, ponderosa pine, Douglas-fir, aspen, mountain meadow parkland, and riparian highland habitats.

During the field seasons of 2002 and 2003, all known aquatic habitats (beaver ponds, stock ponds, springs, wallows, seeps, and streams) in the Perfecto analysis area were inventoried to determine occupancy of amphibians. Boreal toads were not detected from these surveys and there are no known documented occurrences of boreal toads within the Perfecto analysis area, although suitable habitat is present. In general, timber harvest activities that negatively affect the quality or quantity of wetlands within the current

range of boreal toads can be harmful to this species (Keinath and McGee 2005). Protection measures for riparian areas and stream habitat are incorporated into the design of the timber sale, and should protect boreal toad breeding habitat and individuals if they are present when timber sale activities take place. Since proposed activities will not occur in, adjacent to, or near water sources, potential breeding habitat should not be impacted.

Although timber harvest activities are not expected to impact breeding habitat due to the location of harvest units relative to potential breeding habitat, boreal toads may be particularly vulnerable to impacts of timber harvesting when harvest activities occur within their dispersal range from breeding sites, and during the late summer when adults migrate into upland forested habitats (Keinath and McGee 2005). Clearcuts may influence boreal toad use of migration corridors due to the decreased moisture and increased heat within the clearcut (Bartelt 2000, Keinath and McGee 2005). Clearcuts are not proposed for the Perfecto Creek Timber Sale; however, individual tree removal associated with group and individual tree selection treatments may enhance or reduce the structure and composition of shrub understories. Shrub understories provide important microhabitats that aid in thermoregulation by providing water and heat energy for boreal toads (Bartelt 2000, Keinath and McGee 2005). Soil compaction from harvesting activities may reduce the availability of rodent burrows used by boreal toads as over-wintering hibernacula (Loeffler 2001, Keinath and McGee 2005). In some cases, timber harvesting can benefit boreal toads by increasing small mammal habitat and thus available burrow habitat (Keinath and McGee 2005). Boreal toads may over-winter in these burrows and in slash piles (Bartelt 2000, Keinath and McGee 2005). The proposed Perfecto Creek Timber Sale may impact individuals, but is not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

Northern leopard frog

This species inhabits the banks and shallow portions of marshes, ponds, lakes, reservoirs, streams, and other permanent water bodies, especially those having rooted aquatic vegetation. Breeding takes place in the shallow, non-flowing portions of permanent water bodies and in seasonally flooded areas adjacent or contiguous with permanent pools.

During the field seasons of 2002 and 2003, all known aquatic habitats (beaver ponds, stock ponds, springs, wallows, seeps, and streams) were inventoried to determine occupancy of amphibians. Northern leopard frogs were not detected from these surveys and there are no known documented occurrences of this species within the Perfecto analysis area. Protection measures for riparian areas and stream habitat are incorporated into the design of the timber sale and should protect northern leopard frog habitat and individuals if they are present when timber sale activities take place. Proposed activities will not occur in, adjacent to, or near potential northern leopard frog habitat to impact this species. No impacts on northern leopard frog are anticipated from the proposed Perfecto Creek Timber Sale.

Management Indicator Species-

Refer to the Sensitive Species section above for an analysis of effects on American marten, northern goshawk, and brewer's sparrow.

Rocky Mountain Elk
Elk on the GMUG National Forest are altitudinal migrants, using different ranges for winter, spring (transitional), summer, and fall (transitional). Summer ranges occur at high elevations that extend above treeline. Winter ranges are at low elevations that encompass large areas of shrubland habitat and extend to the lower elevations of montane forests.

Elk utilize habitat within and surrounding the Perfecto analysis area primarily during the spring, summer, and fall. During the summer, they use high elevation spruce-fir, aspen, and sub-alpine meadows, as well as alpine willow above treeline. Willow covered stream corridors (Perfect and Chavez Creeks) provide cover and are important foraging areas that encompass 5% of the analysis area. Aspen stands bordering parklands provide hiding cover and foraging opportunities. Parks and meadows are a critical component within the life needs of elk in that they provide the bulk of the grasses and forbs that elk depend on during spring, summer, and fall. Parks and meadows comprise 21% of the Perfecto analysis area. The 6,870-acre Perfecto analysis area represents 0.22% of the total forest-wide habitat (3,103,088 acres; Table 24) potentially suitable for elk.

Table 24. Potentially suitable Rocky Mountain elk habitat (acres) on the GMUG National Forest by vegetation cover type and habitat structural stage.

Cover Type	1	2	3A	3B	3C	4A	4B	4C	Total
Aspen		4,743	55,301	211,399	41,446	23,567	227,148	176,278	739,881
Cottonwood Riparian			248	100		2,530	1,532	42	4,452
Gambel Oak		291,383	472	82		416			292,353
Mountain Grassland	462,355								462,355
Mountain Shrub		165,073							165,073
Sagebrush		101,838							101,838
Wet Meadow	4,573								4,573
High Elevation Riparian (Blue Spruce)			101	242	560	234	597	836	2,570
Bristlecone Pine/Limber Pine			2,261	1,630	45	2,104	1,877	33	7,950
Douglas-fir			3,396	8,226	2,416	8,848	16,192	6,590	45,668
Lodgepole Pine		758	7,100	124,674	54,741	4,658	49,472	38,887	280,290
Pinyon-juniper			28,542	37,121	625	29,956	39,064	1,554	136,861
Ponderosa Pine		251	10,530	13,060	94	42,180	44,102	965	111,183
Spruce-fir		269	38,910	99,888	11,933	72,923	322,729	201,388	748,040
Total	**466,928**	**564,315**	**146,861**	**496,422**	**111,860**	**187,416**	**702,713**	**426,573**	**3,103,088**

The Perfecto analysis area is contained within Colorado Division of Wildlife (CDOW) Game Management Unit 67 which is part of Data Analysis Unit (DAU) E-25 for elk. The CDOW population objective for elk in this DAU is 4,500. The post-hunt population estimates for DAU E-25 have been above population objectives every year from 1980 to 2004 (population estimates for 2005 were not available at time of writing), ranging from 4,530 to 7,683. Population estimates within DAU E-25 for this 24-year period suggests that the Perfecto analysis area is within an area containing a stable elk population.

The GMUG National Forests contain at least a portion of nine DAU's. Population estimates for these DAU's in 2003 totaled 63,880 elk. Total population estimates for these nine DAU's combined have been above population objectives since 1980 (Table 25), although several individual DAU's have been below population objectives at some point in time during this 23-year period.

Table 25. Elk population estimates for all DAU's combined that include acreage on the Forest.

Year	Population Estimate	Year	Population Estimate	Year	Population Estimate
1980	45,854	1988	74,682	1996	71,507
1981	47,386	1989	77,998	1997	71,043
1982	50,918	1990	78,538	1998	65,566
1983	55,787	1991	77,291	1999	64,621
1984	50,320	1992	72,599	2000	58,753
1985	54,103	1993	68,259	2001	60,160
1986	63,337	1994	68,939	2002	58,330
1987	69,152	1995	70,520	2003	63,880

Timber harvest, thinning, and prescribed fire are management activities that can be used to improve elk habitat and ensure the maintenance of food and cover requirements, provided roads are closed to prevent human access. Alternatives 2 and 3 propose road reconstruction and temporary road construction to access timber, but no new roads are proposed. In addition, both action alternatives propose road closures and road obliteration, which would increase habitat effectiveness for elk. Group selection treatments may increase summer foraging habitat for elk. There is no reduction in habitat effectiveness for alternatives 2 and 3 when compared to the No Action Alternative. Human disturbances associated with timber sale activities during administration of the sale would most likely reduce the habitat effectiveness during that time, but this effect would be short-lived and not constitute a permanent change.

The proposed harvest units are used primarily as summer habitat by elk; consequently, Alternatives 2 and 3 would likely temporarily displace elk due to road reconstruction, temporary road construction, logging traffic, and activities associated with logging operations. Habitat alteration and temporal disturbance is not expected to result in a defined change in population numbers or trends at the project level or Forest scale. Openings created from proposed treatments have the potential to reduce the quality of elk security cover, but they also have the potential to increase foraging habitat. The project may temporarily displace or alter how individual elk use affected habitats in terms of habitat alteration and/or disturbance, but these effects will not result in a change in population numbers or trends at the project level or Forest scales. As the affected acres (910 acres in alt. 2; 780 acres in alt. 3) represent 0.029% and 0.025% of potentially suitable habitat available to elk on the GMUG National Forest, these minor changes in habitat are expected to result in a non-quantifiable impact on elk individuals in the project area.

Red-naped Sapsucker

On the GMUG National Forests, the abundance and distribution of the red-naped sapsucker is largely tied to the availability of deciduous woody vegetation, especially aspen and willows. This species is a primary cavity nester dependant on aspen stands or the aspen component of mixed stands for nesting and summer foraging, particularly when these habitat types occur in or adjacent to riparian areas. Primary habitat includes areas dominated by aspen, cottonwood, and willow vegetation, encompassing approximately 25 percent (830,462 acres) of the GMUG National Forests. Secondary habitat consists of approximately 21 percent (704,772 acres) and is comprised of Douglas-fir, lodgepole pine, and ponderosa pine (both pure stands and stands with an aspen component), in addition to immature (3A, 3B, and 3C) stands of both aspen and cottonwood.

The red-naped sapsucker is considered globally "secure" by the Natural Heritage Program due to its wide distribution across North America. According to the Breeding Bird Survey (BBS), populations appear to be stable to increasing in the United States, with areas of local declines. Local declines may be related to a loss of cottonwood and aspen nesting habitats. Based on BBS trend data for the period 1966 to 2004, red-naped sapsuckers have exhibited a significant positive population trend of 4.43 percent. However, BBS trend estimates may be confounded by recent changes in sapsucker taxonomy splitting the red-naped from the yellow-bellied sapsucker. Within the state of Colorado and the Southern Rockies physiographic region, red-naped sapsucker populations have exhibited similar upward trends, exceeding national trends.

Red-naped sapsuckers have been detected on nine BBS routes on the Forest, with insignificant negative trends observed on three out of four routes within the Uncompahgre Plateau Geographic Area, a significant positive trend observed within the North Fork Valley and Grand Mesa Geographic Areas, and positive upward trends observed on three routes within the Gunnison Basin Geographic Area, one which was significant. Single site analysis on BBS routes within the Forest may not be statistically valid due to low sample sizes and the amount of suitable red-naped sapsucker habitat sampled by the routes: from 1966 to 2004, only 0.92 percent (6,806 ac) of all aspen habitat on the Forest (738,515 ac) was sampled by the BBS.

From 1998 to 2004, Monitoring Colorado's Birds (MCB; a program implemented by the Rocky Mountain Bird Observatory) detected 186 red-naped sapsuckers on 25 transects between 1998 and 2004 on the Forest. Most of the observations occurred in aspen and high elevation riparian dominated habitat types. Interestingly, 62 percent of all red-naped sapsucker observations throughout the MCB survey area (includes the state of Colorado) were on the Forest. Based on MCB data, red-naped sapsuckers appear to be in an upward trend on the Forest. The average number of red-naped sapsuckers per transect range from 2.2 birds in 2001 to 4.15 birds in 2004. Within the MCB survey area (all of Colorado), their data reveals that the highest red-naped sapsucker density estimates occurred in high elevation riparian areas that contained aspen and willow habitat components with estimated densities in 2004 at 0.602 birds per hectare. At this time, MCB data for their entire survey area, including the GMUG National Forests, is insufficient to detect population trends due to the relatively short time period that data has been collected (7

years; a minimum of 12 years is needed to detect population trends, the necessary time period may be longer depending on detection rates of species).

Red-naped sapsuckers were documented within the Perfecto analysis area. Neotropical migrant bird surveys were conducted using a modification of a habitat-based point-count protocol (Huff et al. 2000). Surveys took place from May to June during 2003, 2004, and 2005, consisting of transects representing three different habitat types: spruce-fir, willow riparian and open parkland. In 2004, four red-naped sapsuckers were detected in willow riparian habitat along Perfecto Creek, adjacent to forested habitat consisting of aspen. In 2005, two red-naped sapsuckers were detected on habitat edges during implementation of a bird point-count transect in open parkland habitat. The birds were observed using aspen habitat at the forest-meadow edge, which was adjacent to riparian willow vegetation along Chavez Creek.

Within the Perfecto analysis area, the red-naped sapsucker primarily utilizes mature aspen and aspen/conifer mixes comprised of structural stages 4A, 4B, 4C, and 5 that are in close proximity to willow vegetation. Important habitat components of these mature stands include live aspen with heart rot decay that red-naped sapsuckers use for cavity excavation. The majority of red-naped sapsucker habitat within the analysis area is secondary habitat comprised of younger aspen stands in structural stages 3A and 3B.

Although habitat capability values remain the same for red-naped sapsucker under all alternatives, suitable red-naped sapsucker habitat is impacted by the proposed activities. Units 8, 14, and 15 include treatments designed to enhance the existing aspen component. These treatments consist of aspen rehabilitation treatments that will remove the conifer component of these stands to provide improved growing conditions for existing aspen. Red-naped sapsuckers have not been detected in the units proposed for aspen rehabilitation however, habitat within these units does constitute suitable red-naped sapsucker habitat.

Units prescribed for aspen rehabilitation to reestablish aspen dominance in mixed conifer-aspen stands may provide future nesting and foraging habitat for red-naped sapsuckers. The treatment proposes conifer removal; aspen will be cut only as needed for access or safety. Aspen inclusions within other proposed units are to be retained. All proposed aspen rehabilitation treatments benefit the maintenance and enhancement of existing aspen clones. There is a need to implement actions designed to promote aspen regeneration because there is some indication that aspen recruitment is low, primarily due to a lack of disturbance (Wiggins 2005). The general rule of fire suppression on public lands will likely have a negative impact on red-naped sapsuckers in the long-term by reducing the generation of new (post-disturbance) aspen stands, and by allowing encroachment of conifers into aspen habitats, resulting in reduction of aspen as these stands eventually become dominated by conifers. Proposed aspen rehabilitation treatments address these factors and are intended to maintain aspen persistence over the long term in the Perfecto analysis area, potentially benefiting species such as the red-naped sapsucker.

Direct effects include the potential to temporarily disturb, as well as displace, individual red-naped sapsuckers if they are present within the proposed units during timber harvest operations, in addition to changing habitat structural stage conditions. There will be no loss of red-naped sapsucker habitat since the aspen component will be retained. Proposed aspen rehabilitation treatments will result in an increase in the aspen cover type since the conifer component will be removed from stands currently classified as spruce-fir. Under alternatives 2 and 3, the aspen cover type would increase by 36 acres and 61 acres, respectively. Indirect effects include the potential for future regeneration of aspen, as well as the continued persistence of aspen stands within the project area. Indirect effects could benefit the red-naped sapsucker in the long-term. The proposed project may temporarily displace or alter how individuals use affected habitats through habitat alternation and disturbance from timber harvest operations, but these effects will not result in a change in population numbers or trends at the project level or Forest scale.

Other Species and Habitats of Concern -

Mature or Interior Forest Species

Species that rely on mature forest or interior forest habitats for which habitat capability information exists that have not been previously discussed include the brown creeper, red squirrel, red-backed vole, golden-crowned and ruby-crowned kinglet, and the northern saw-whet owl. As indicated in table 13, only relatively slight changes in habitat capability would occur. This is primarily due to harvest activities maintaining the majority of treated stands in the mature (4B) structural stage. Since HCI values for brown creeper do not meet minimum standards, selection of alternative 2 would require a non-significant Forest Plan amendment to meet the requirements of the National Forest Management Act. The brown creeper is impacted primarily by the reduction of large, old spruce-fir trees that are preferred for foraging. While these stands will maintain the structural characteristics of a mature stand (SS4B), the reduction in overstory density could impact brown creeper foraging habitat quality until these stands recover to SS 5 (20-30 years). SS4A, 4B, and 4C stands will continue to provide foraging habitat for brown creepers although habitat quality may be somewhat reduced. Mature forest habitats (SS 4A, 4B, 4C, 5) will account for a minimum after treatment of 56% of forested habitats and at least 39% of suitable habitat (spruce-fir > 40% canopy cover) within the analysis area for this species. Design criteria to provide snags and wildlife trees within treated units will maintain potential nesting and foraging sites within and adjacent to proposed treatment units. Project activities could directly impact individual brown creepers by causing displacement; indirect effects include loss of potential foraging habitat. The project may temporarily displace or alter how individual brown creepers use affected habitats in terms of habitat alteration and/or disturbance, but these effects will not result in a change in population numbers or trends at the project level or Forest scales. Red squirrels are important prey for marten, lynx, goshawk, and other predators. Red squirrels use mature forest habitats with large trees, snags and down logs. Maintaining concentrations of down woody debris and snags within harvest units as previously proposed, as well as trees or groups of trees that contain squirrel nests and/or middens, will maintain habitat for red squirrels. Red-backed voles are important prey for boreal owls and marten. Maintenance of coarse woody debris within harvest units to

maintain soil moisture for mosses, fungi, and lichens will provide foraging habitat for this and other small mammal species. Habitat for northern saw-whet owl is limited within the project area primarily due to a lack of preferred foraging habitat. Mature and old growth spruce, aspen, and riparian habitats provide high quality cover for the northern saw-whet owl. Reduction in 4C and 5 structural stages in spruce-fir will degrade existing cover, but improve foraging habitat quality. These units will still provide suitable, but less than optimum cover. The project area provides high quality cover and foraging habitat for canopy feeders such as the golden-crowned and ruby-crowned kinglet. Proposed activities will slightly decrease habitat capability (1% decrease for ruby-crowned, and up to a 2% decrease for golden-crowned; table 13) since treatments will reduce tree density and canopy cover. This primarily affects foraging habitat for the Golden-crowned and ruby-crowned kinglets since they are canopy feeders in that they glean insects from conifer foliage. The decreased habitat capability value for golden-crowned and ruby-crowned kinglet reflects the changes in these stands.

Neotropical Migratory and Year-round Bird Species
Species that require open habitats or a diversity of different habitats distributed throughout the area will have additional available habitat with these alternatives. Although the project area will still have relatively large blocks of mature forest and interior forest habitats (see figures 1B, 2A, and 2B), diversity within these stands is expected to increase over time because of small openings and canopy gaps that the proposed treatments would create. For wildlife, particularly species that benefit from structural diversity, commercial thinning may help to increase structural diversity by allowing vegetation in understory layers to develop (Boyle et al. 1998). Species that may benefit with increased openings and more open canopy include the American robin, dark-eyed junco, great horned owl, mountain bluebird, northern flicker, red-tailed hawk, blue grouse, and others.

Species that require mature forest habitats will have adequate habitat within the Perfecto analysis area, as a minimum of 50.5% of the analysis area will remain in the mature structural stages under alternatives 2 and 3. Where shelterwood and some aspen rehabilitation treatments are proposed, mature habitats will be reduced. Aspen stands within the analysis area currently provide little in the way of suitable mature forest habitat due to suppression of growth from conifer encroachment and lack of structural diversity. Collectively, aspen rehabilitation and shelterwood treatments encompass a maximum of 3% of forested habitats within the analysis area (aspen rehabilitation comprises 2%, and shelterwood comprises 1%). As shown in table 15 and in figures 1A, 1B, 2A, and 2B, although habitat connectivity will be somewhat reduced, connectivity is still maintained under the action alternatives.

Birds of conservation concern (BCC 2002) with documented occurrences in the Perfecto analysis area include the Brewer's sparrow, red-naped sapsucker, green-tailed towhee, MacGillivray's warbler, violet-green swallow, Williamson's sapsucker, and Wilson's warbler. Birds of conservation concern are those species identified by the U.S. Fish and Wildlife Service "that represent our highest conservation priorities". Since proposed treatments will only occur in forested habitat not utilized by Brewer's sparrows, green-

tailed towhees, and Wilson's warblers, no impacts to these species are anticipated from the proposed activities.

Red-naped sapsuckers and violet-green swallows utilize aspen and willow riparian habitats within or adjacent to large parklands within the analysis area. The majority of proposed activities (group selection, shelterwood, and sanitation salvage) will occur in spruce-fir stands and are not expected to affect these species. Alternative 3 would affect the greatest amount of aspen or mixed conifer/aspen habitat (107 acres). Since the purpose of aspen rehabilitation treatments is to retain, maintain persistence, and re-establish aspen dominance in stands where aspen is being suppressed, red-naped sapsucker and violet-green swallow habitat will likely increase if these treatments are successful. Short-term impacts to red-naped sapsucker from proposed aspen rehabilitation treatments are primarily associated with disturbance and displacement when timber harvest operations take place. Red-naped sapsuckers use willow vegetation within the analysis area for foraging; this species is considered a riparian dependent (bird species that place 60%-90% of their nests in riparian vegetation or for which 60%-90% of their abundance occurs in riparian vegetation during the breeding season) bird species due to their dependency upon willow vegetation for foraging. In addition, red-naped sapsuckers typically nest in mature aspen that is in close proximity to suitable willow riparian habitat.

The Wilson's warbler is considered a riparian obligate (bird species that place >90% of their nests in riparian vegetation or for which >90% of their abundance occurs in riparian vegetation during the breeding season) and was documented extensively in willow riparian areas along Chavez Creek in 2005. The MacGillivray's warbler utilizes dense thickets in association with streamside riparian situations (especially willow and alder) or in association with open patches within the forest where early forest succession has produced decent shrub growth. This species is considered a riparian dependent species. Treatments that favor the development of early successional vegetation may benefit the MacGillivray's warbler. Willow riparian habitat will not be affected from the proposed treatments. Design criteria will ensure the maintenance of aspen snags and live heart rot decayed trees for cavity nesting for red-naped sapsucker and violet-green swallow.

Cumulative Effects

Cumulative effects are the effects on the environment, both direct and indirect, that result from the incremental effects of an action when added to other past, present and reasonably foreseeable future actions of the agency and other agencies or private entities (Boyle et al. 1998). Many wildlife species benefit from a variety of seral stages that are well distributed in a variable spacing regime throughout their home range. Other species however, need relatively large blocks of interior mature forest habitat. Past activities resulted in a variety of forest stands in various stages of growth within the Perfecto analysis area, but the majority of the forested habitat consists of mature forest. Currently, mature forest habitats (vegetative structural stages (SS) 4 and 5) comprise approximately 68.7% (3,470.9 acres) of forested habitats within the Perfecto analysis area. This leaves 1,579.6 acres (31.3% of forested habitat) in the sapling/pole stages, the majority of which

is in the pole stages. There are 1,440 acres that are currently in the grass/forb stage and 38 acres in rock or bare ground. Proposed activities will not increase the grass/forb cover types since regeneration harvests (i.e., clearcuts) are not proposed. Changes are primarily from the 5 and 4C stages to the 4B stage from group and individual tree selection cuts, and from 5, 4C, and 4B to 4A from shelterwood and aspen rehabilitation treatments. Mature forest within the project area will account for 68.7% of forested habitat under alternatives 2 and 3. Although mature forest percentages are the same for both action alternatives, alternative 2 would have slightly more mature forest with greater than 40% canopy cover (29.6 acres) than alternative 3, and alternative 3 would have slightly more mature forest with less than 40% canopy cover (29.7 acres) than alternative 2. Old growth would constitute approximately 6.4% (324 acres) and 12.9% (652 acres) of forested habitat within the analysis area for alternatives 2 and 3, respectively. Lynx, wolverine, goshawk, and boreal owl are species that use large territories of mature and old growth forest that may be influenced by the cumulative effects of timber harvest, open road density, and other human activities.

The Perfecto analysis area and the surrounding 7th level watersheds (Pauline and Nutras Creeks), as well as the Stewart Creek Lynx Analysis Unit (57,000 acres) used for cumulative effects analysis for lynx, have an extensive history of land disturbance, dating back to the years of Native American occupancy and the early years of European settlement. Timber harvesting for settlement, particularly for firewood and ranching operations, likely took place in the late 1800's and early 1900's. Little additional harvest occurred until commercial harvesting began in the 1950's. The following cumulative effects analysis incorporates all known activities taking place within the Stewart Creek Lynx Analysis Unit (LAU), which includes the Pauline and Nutras Creek watersheds that encompass the Perfecto analysis area.

Timber harvesting appears to be one of the main contributors to the development of vegetative patterns that exist today. Available records from local databases indicate that large-scale logging within the Stewart Creek LAU began in the 1950s. The primary method used in timber management during this period was clearcutting. Approximately 60 acres (0.1%) were clearcut on National Forest lands within this LAU in 1959. Some salvage logging occurred in 1943 and 1946 in Perfecto and Pauline Creeks (Haines 1998). Timber harvesting prior to the 1940s was mainly associated with ranches located in Cochetopa Park and Cathedral (Haines 1998).

During the 1960s, an estimated 2,209 acres (3.9%) were treated within the Stewart Creek LAU. Treatment methods used during this period consisted of clearcutting and shelterwood seed tree cuts. Associated activities included site preparation and additional treatments within previously harvested areas consisting of light partial cuts for release and weed treatment purposes and moderate partial cuts that removed overstory trees. The Elk Park #1, Chavez Creek, Big Meadows, and Pauline Creek Timber Sales were sold in the 1960s, with a total combined harvest volume of 16.6 million board feet; (Haines 1998).

From 1970 to 1980, harvest methods included sanitation salvage and shelterwood preparation cuts. Activities associated with these treatments included site preparation, light partial cuts for release and weed treatment purposes, and removal of overstory trees. During this period, a total of 2,775 acres (4.9%) were treated within the Stewart Creek LAU. The West Pinos, Elk Park #2, Perfecto Creek, and Nutras Creek Timber Sales were sold in the 1970s, with a total combined harvest of 9,659 MBF (Haines 1998).

In the 1980s, timber harvesting was conducted using primarily shelterwood methods, sanitation salvage, and clearcutting. Re-entries into previously harvested stands occurred consisting of light (release and weed treatment) to moderate (overstory removal) partial cuts. Total area treated during the 1980s is estimated at 2,573 acres (4.5% of LAU). The Chavez Creek Timber Sale was sold in 1988, harvesting 1,370 MBF (Haines 1998).

A change in harvest methodology took place in the 1990s with a shift to primarily group selection and individual tree selection treatments. Sanitation salvage and shelterwood methods continued during the 1990s. In addition, treatment of natural fuels by removal and mechanical methods began to be used within the Stewart Creek LAU. The Big Meadows and Elk Park Timber Sales were sold in 1993, each harvesting 3.3 and 3.5 MBF, respectively (Haines 1998). Additional re-entries into previously harvested stands included light and moderate partial cuts that utilized release and weed treatment and overstory removal methods. Approximately 3,522 acres (6.2%) were treated from 1990 to 2000.

Since 2000, timber harvesting has decreased within the Stewart Creek LAU with only 339 acres (0.6%) treated. The majority of these acres were treated using precommercial thinning. Several re-entries were implemented consisting of mechanical compacting (treatment of activity fuels) and light partial cuts (release and weed treatment).

Overall, 11,482 acres (20.1%) were treated using silvicultural methods within the Stewart Creek LAU. These acres, however, do not reflect actual affected acres because follow-up treatments took place within previously harvested stands. Consequently, there is some duplication of acres resulting from multiple treatments that were implemented within the same stands at different points in time. Actual affected area within the Stewart Creek LAU is estimated at 9,650 acres.

Future timber harvests in the Perfecto analysis area and in the Pauline and Nutras Creek Watersheds have not been specifically identified at this time. There are no known future vegetative treatment proposals on BLM lands bordering the National Forest within the Pauline and Nutras Creek Watersheds. At this time, no other activities have been identified for future implementation within the Perfecto analysis area.

In addition to timber harvest, fire has altered the forested habitat over portions of the Perfecto analysis area, Pauline and Nutras Creek watersheds, and the Stewart Creek LAU. Historical changes to upper elevation habitats in the Perfecto analysis area were likely relatively large scale, infrequent, and had correspondingly large-scale effects on local wildlife populations, including management indicator species and sensitive species.

Large landscape forest fires provided extensive new habitat areas for woodpeckers (including hairy and three-toed) and local populations were likely high. Deer, elk, and bear benefited from new forest openings and forage sources, although hunting pressure on these species was high historically, especially in the early 1900's, and limited population sizes of many big game species.

Historically, fire has played a role in establishing and shaping many of the forested and non-forested areas within the Perfecto Creek project area and throughout the Stewart Creek LAU. This area contains extensive evidence of forest fire activity prior to European settlement. Native Americans occupied the area seasonally and used fire for a variety of reasons, including, but not limited to, managing forest and range resources, defensive and offensive maneuvers, and food production. The Stewart Creek LAU, including the Perfecto analysis area, was likely occupied from spring through fall with the main use being food gathering. Food gathering activities most likely involved hunting, fishing, root collection and other activities associated with subsistence. Native Americans used fire as a tool to improve their chances of successful hunts, sprout aspen and willows for beavers, kill certain trees for their use, clear space for protection from predators (decrease cover and increase visual detection of predators, primarily wolf, bear, and lion), and to decrease forest encroachment on parklands (keep parks open, primarily for buffalo and other big game management).

Changes to forest habitat through past timber harvest and fire have taken place on many of the 6,870 acres of forested and non-forested habitat in the Perfecto analysis area. The proposed activities will harvest approximately 15.4 – 18.0% (780 – 910 acres) of forested habitat (5,050.5 acres). As described earlier, few of those acres will provide additional pole/sapling or earlier structural stages. The majority of treatment acres will remain in the mature (4B) structural stage.

The Perfecto analysis area currently provides relatively good habitat for marten, wolverine, lynx, boreal owl, and goshawk. These species prefer relatively large blocks of interior mature forest with some areas of younger successional forest, and relatively little human disturbance. Proposed harvest will provide many small openings that will promote regeneration and growth providing an interspersion of younger age classes within existing mature and old growth stands. The proposed activities will not occur in nor affect potential Brewer's sparrow habitat within the Perfecto analysis area. Cumulative effects to this species are primarily associated with livestock grazing and fire. Continued use of shrubby vegetation within parklands and willow shrub habitat in riparian areas by Brewer's sparrows in the Perfecto Analysis area will likely be dependent on riparian and range conditions related to livestock grazing.

The Perfecto Creek Timber Sale is located within the Cochetopa Grazing Allotment. This allotment includes all of the Perfecto analysis area in addition to a larger area outside the analysis area. This allotment is administered by the Gunnison Ranger District and currently has nine pastures, 3 of which encompass the Perfecto analysis area. Grazing permits are issued to 2 permittees. Current permitted use is at 428 cow/calf pairs from July 1 to September 30; under a nine pasture deferred rotation system.

The Perfecto Creek Timber Sale lies within the Perfecto, Upper Chavez, and Pauline pastures. The Perfecto pasture includes Perfecto Creek and contains the northwest portion of the Perfecto analysis area. Up to 125 cow/calf pairs are permitted on this pasture, for a period of 10 to 15 days. The southwest portion of the analysis area, including Chavez Creek, falls within the Upper Chavez pasture. In this pasture livestock grazing varies between 10 to 14 days, with up to 428 pairs. The Pauline pasture comprises Perfecto and Pauline Creeks within the northeast portion of the Perfecto analysis area. Up to 428 pairs graze this pasture, but 125 pairs of those 428 may be in the Perfecto pasture for a period of 10 to 15 days. During that 10 to 15 day period, 303 to 428 pairs may be present in the Pauline pasture. The Cochetopa Allotment Management Plan is currently under revision and is scheduled for completion in 2007.

The Perfecto analysis area sees relatively extensive use of existing open roads. Based on an analysis of the system road inventory within the 6,870 acre Perfecto analysis area, there are a total of 19.08 miles of roads, of which 15.65 are currently open to motorized vehicles and 3.43 miles are closed. Adjusted road density is calculated at 0.62 miles per square mile. One trail (UT7070) occurs on the southern edge of the analysis area boundary along Nutras Creek, totaling 0.85 miles. Motorized recreation is confined to existing open roads within the analysis area and consists primarily of full sized vehicles, motorcycles, ATVs, and infrequent snowmobile use. Significant use is seen during the big game hunting seasons. The main access routes into the project area are the Perfecto Creek (NFSR 794.2B) and Cochetopa Creek (NFSR 794.0) roads. Big game hiding cover along roads in the Perfecto analysis area is good in forested habitats due to the dense growth of trees in the analysis area and overall cover is excellent (optimum) due to the high percentage of structural stages 4 and 5.

Based on an analysis of the system road inventory within the Stewart Creek LAU, there are a total of 99.63 miles of roads, of which 70.66 miles are currently open to motorized vehicles and 28.97 miles are closed or decommissioned. Adjusted road density is calculated at 0.22 miles per square mile. Several trails reside within the Stewart Creek LAU totaling 41.65 miles. Road density is confined primarily to the northeastern portion of the Stewart Creek LAU, and most trails are concentrated within the southern and eastern portions of the LAU. The main access routes into the Stewart Creek LAU are the Perfecto Creek (NFSR 794.2B) and Cochetopa Creek (NFSR 794.0) roads.

During the summer and fall, recreational activities within the analysis area include 2-wheel and 4-wheel drive vehicles, all-terrain-vehicles (ATV), motorcycle and mountain bike riding, snowmobiling, horseback riding, big game hunting, firewood gathering, dispersed camping, and fishing in Chavez, Perfecto, and Nutras Creeks. The Cochetopa Creek Road (NFSR 794) and the Perfecto Creek Road (NFSR 794.2B) corridors receive the majority of recreational use, with the Cochetopa Creek Road providing access into the eastern portion of the La Garita Wilderness. Snowmobiling occurs throughout the analysis area along road corridors and open meadows. Dispersed camping is insubstantial during the summer, but becomes widespread during the big game hunting seasons. Overall, recreational use within the analysis area is extensive and well distributed primarily during firewood gathering and big game hunting seasons. During

other seasons, most recreational use is concentrated on and around low standard National Forest System roads and non-system roads, centered on the motorized recreational user. Similar recreational activity is seen outside the Perfecto analysis area within the Stewart Creek LAU. Most use within the southern portion of the LAU is from hikers and backpackers accessing the La Garita Wilderness, many of which climb San Luis Peak. Road impacts are likely influential on many wildlife species, including forest interior species like the pine marten, goshawk, lynx, or wolverine. Elk are a management indicator species that likely experience negative effects from road use. The red-naped sapsucker and three-toed woodpecker are less likely to be influenced by open road density or road use.

Lynx and wolverine favor the use of remote habitats with little human intrusion. The presence of open roads discourages use of an area by lynx and wolverine. Goshawks may be negatively influenced by road use if the road is located near their nesting sites and if frequency of road use is more intensive than is typical for that localized site. In addition, goshawks have abandoned nests when unaccustomed road use takes place near their nest. As there are no known goshawk nests or territories within or adjacent to the Perfecto analysis area, no impacts to goshawk due to road use are expected. Boreal owls are quite tolerant of human and machine noise and disturbance does not seem to be an important factor in nest loss nor owl movements (Hayward and Verner 1994). They are not expected to be impacted by road use within the Perfecto analysis area. Cumulatively, road use within the Perfecto analysis area may inhibit lynx and wolverine use if they are present in the analysis area. Future timber sale proposals could result in new road construction, as well as road obliterations and/or closures because of future travel management decisions. Construction of new roads could add to the impact of existing roads, while obliteration and vehicle closures would improve potential habitat for the lynx and wolverine.

Given the status of the Canada lynx (Threatened), a separate cumulative effects analysis was conducted for this species. The lynx is a boreal forest predator that uses very large territories of early successional, mature, and old growth forests, and may be influenced by the cumulative effects of changes to forest habitat from timber harvest, large-scale forest fire, open road density, and other human activities on a landscape scale. As described above, the project area and the Stewart Creek LAU has a history of such changes to forest habitat. Cumulatively, these actions likely have an influence on lynx habitat quality within these areas now and in the future.

Considering all the past, present, and future activities occurring in the Stewart Creek LAU, it is unlikely that the proposed Perfecto Creek Timber Sale would add cumulatively to existing impacts on the lynx to the extent that an individual lynx or its home range (Lynx Analysis Unit) would be jeopardized. Given the small percent (0.20%) of lynx habitat changed within the Stewart Creek LAU from the proposed project, the function of the LAU would not be compromised by the proposed activities. Lynx habitat would remain in the 6,870-acre analysis area at sufficient levels to provide potential denning habitat, winter foraging habitat, and areas of connectivity. With reductions in denning habitat predicted at 69.6 acres, denning habitat would still comprise at least 19.9% of the

overall lynx habitat within the Stewart Creek LAU. Other lynx habitat would increase by 69.6 acres and encompass 49.4% of overall habitat within the LAU. Winter foraging habitat will not be negatively affected and is expected to increase over the long term. With the removal of overstory trees in harvest units, foraging habitat conditions are expected to develop over time and are anticipated to improve in areas where they currently exist due to increased understory vegetation, seedling regeneration, and accelerated growth of existing young trees. Distribution of winter foraging habitats will improve over time with new regeneration in proposed shelterwood cuts, openings in group selection units, and along obliterated roads as new trees grow to provide above snow foraging opportunities for snowshoe hare. The Perfecto Creek Timber Sale will not compromise habitat connectivity within the Stewart Creek LAU since mature and old growth forest conditions will be maintained along ridges and adjacent to willow riparian areas.

Private and other non-federal lands are limited within the Stewart Creek LAU. Only 160 acres of private land occur within the LAU, located south of the Eddiesville trailhead. This private land includes 52 acres of winter foraging habitat and 108 acres of non-habitat. This land has been owned by a single family for at least 30 years and is used primarily for livestock grazing with some non-motorized family recreation (Mauch Pers. Comm. 2005). Although rested intermittently, this property is grazed more extensively than the surrounding National Forest; the season of use varies yearly but typically takes place from July 1 to September 15 (Mauch Pers. Comm. 2005). One small cabin currently exists on the property (Mauch Pers. Comm. 2005). No recent development has occurred and none is anticipated in the near future. Due to the isolation (surrounded on all sides by National Forest and on three sides by wilderness) of this private land within the Stewart Creek LAU, future development is not expected although the potential exists for some development in the form of vacation home construction. Since 67.5% of this private land is non-habitat, the likelihood of development in lynx habitat is slight. If development occurs in the future, lynx habitat quality may be reduced due to human presence but is unlikely to be changed to unsuitable unless development occurs within winter foraging habitat. No other cumulative effects are anticipated.

For additional information on sensitive species, management indicator species, and federally listed species (Canada lynx), please the Biological Evaluation, Management Indicator Species Assessment, and Biological Assessment for the Perfecto Creek Timber Sale, on file at the Gunnison Ranger District Office.

Recreation

Affected Environment

Recreational opportunities in the Perfecto Creek area center around the motorized recreational user. The Recreation Opportunity Spectrum (ROS) classification for the project area is Roaded Natural. South of the project area is the La Garita Wilderness Area (La Garita). The ROS classification for this portion of the La Garita is Semi-Primitive Non-Motorized (SPNM). The Primitive classification can be found within the interior of the La Garita, but is not part of the project area. The Visual Quality Objective for the majority of the area is modification, with areas of maximum modification associated with the old partial clearcut (square units) harvesting in the 1960s.

Dispersed Recreation

In the summer and fall months, common activities within the project area are: 2-wheel and 4-wheel drive vehicle driving; all-terrain-vehicle (ATV), motorcycle, and mountain bike riding; horseback riding; big game hunting; firewood gathering; dispersed camping; and stream fishing in Chavez, Perfecto, and Nutras creeks. Other activities south of the project area within the La Garita include: dispersed camping; horseback riding; backpacking; stream fishing; and hiking.

Within the project area, the Cochetopa Creek Road (NFSR 794) and the Perfecto Creek Road (NFSR 794.2B) corridors receive the major share of the recreational use. The end of the Cochetopa Creek Road is the major entrance into the eastern portion of the La Garita. From the Eddiesville and Stewart Peak trailheads at the end of the road, recreationists access San Luis Peak (14,014 feet), Stewart Peak (13,983 feet), and Cochetopa Creek. The trailheads have developed parking, bulletin boards, and register boxes for visitor information. Also, the Eddiesville trailhead has a corral. The Perfecto Creek road (NFSR# 794.2B) and the Cochetopa Creek Road (NFSR# 794.0) durable three-season gravel-surfaced roads, suitable for 2-wheel drive vehicle travel when road surface conditions are dry or wet. Both road corridors provide a ROS Roaded Natural recreational opportunity.

Dispersed camping is minimal during the summer, but can be extensive during any of the big game hunting seasons. Within the project area, there are numerous identified established dispersed campsites; most of which are located near the Cochetopa Creek Road or the Perfecto Creek Road. Other identified dispersed campsites are located on spur roads, well away from the Cochetopa Creek Road or the Perfecto Creek Road. These secluded campsites provide a higher level of solitude due to their remoteness.

During firewood gathering and the big game hunting seasons, recreational use within the project area is extensive and well distributed. In other seasons, use is limited to 4-wheel driving, ATV, motorcycle, and mountain bike riding on existing low standard National Forest System roads, and non-system roads. Snowmobiling occurs throughout the project area along road corridors and open meadows. All of these activities are consistent with the Roaded Natural classification and setting.

Travel Management
Travel management of the project area is considered open year-long to motorized vehicles on established, open roads. Driving on or off existing roads and trails in a manner which damages or unreasonably disturbs wildlife, or vegetation resources is prohibited. The project area contains 5.3 miles of high standard, gravel surfaced Perfecto Creek and Cochetopa Creek Roads. The system road inventory within the project area shows a total of 11.2 miles. Of which, 9.3 miles are currently open to motorized vehicles, and 1.9 miles are currently physically closed to motorized vehicles (Map 4 – Existing Road System Map in **Appendix A).**

There are no system or non-system trails residing within the project area. South of the project area, La Garita system trails are Stewart Creek (NFST 470), Cochetopa Creek (NFSR 465), and Machin Basin (NFSR 784). Stewart Creek and Cochetopa Creek Trails receive moderate use since these trails are the main access to San Luis Peak. Machin Basin Trail receives little use from the Gunnison Ranger District side of wilderness even though the trail accesses popular Machin Lake. Hikers and horseback riders are allowed on La Garita trails; however most use is from hikers and backpackers climbing San Luis Peak.

Currently, there are no known motorized routes encroaching into the La Garita Wilderness. Due to the relatively steep and rocky nature of the wilderness boundary, no encroachment is anticipated in the future.

<u>Environmental Consequences</u>

Alternative 1 – No Action
Recreational use would continue under current policies. Within the project area, 9.2 miles of roads will remain open for the motorized recreational user. The only management activities to occur would be complete signing of the La Garita Wilderness Area boundary at all access points, and monitoring and possible re-closing of currently closed roads within the project area. Concerning dispersed recreation, firewood gathering and dispersed camping will continue on most or all of the currently open roads.

Concerning visual quality, the project area is well screened due to relatively flat terrain. However, past timber sale activities (four partial clearcut units in the 1960s) along the Perfecto Creek Spur Road (NFSR 794.2B1) are currently visible from Willow Mesa in the La Garita. As time passes, these units will become less visible due to continued natural restocking of spruce.

While traveling on the Perfecto Creek Spur Road, Chavez BR1 Road (NFSR 794.2C), and Chavez BR2 Road (NFSR 794.2D), past timber sale activities (ten partial clearcut units in the 1960s) are very visible due to the relatively square or rectangular shape of each harvest unit. As time passes, these units will become less visible due to continued natural restocking of spruce and as the existing spruce reproduction continues to mature.

Currently, there are no known motorized routes encroaching into the La Garita Wilderness. Due to the relatively steep and rocky nature of the wilderness boundary, no encroachment is anticipated from the No Action Alternative.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement

Recreational use will be affected by concentration and redirection. With over one-third of the project area's existing open road miles (3.2 miles of 9.2 total miles) proposed for either closure or obliteration, four-wheel driving, ATV, motorcycle, and mountain bike riding, firewood gathering, and dispersed camping will be more concentrated. With spur road closure and obliteration, all of these activities will be concentrated onto the Cochetopa Creek Road and Perfecto Creek Road and only the 4-wheel drive, low standard Ignacio Park Road (NFSR 794.2A), located in the northeast portion of the project area. Several dispersed campsites will become inaccessible to vehicles, thus no longer usable. New dispersed campsites in environmentally desirable locations need to be established to accommodate the displaced dispersed campers. Potential campsites could be created near the beginning of closed roads or in new locations along open roads. More vehicle congestion may be evidenced on the Cochetopa Creek Road and Perfecto Creek Road during the peak weekends of firewood gathering and the rifle hunting seasons. Non-motorized users may redirect their use into areas with proposed closed roads, especially during the hunting seasons. After sale activities cease, wildlife solitude will be increased, thus increasing the possibility of more big game animals and more hiker and horseback rider hunters.

Concerning visual quality, as stated in the No Action Alternative the project area is well screened due to relatively flat terrain. However, past timber sale activities (four partial clearcut units in the 1960s) along the Perfecto Creek Spur Road (NFSR 794.2B1) are currently visible from Willow Mesa in the La Garita. Alternative 2 proposes group selection harvesting on 747 acres and Alternative 3 proposes group selection harvesting on 550 acres. Each “Group” will be approximately 1/4 acre in size. Other Individual Tree Mark (ITM) harvest cutting will occur on 123 acres. Due to the small size of each group or individual trees marked, individual groups and trees will not be visible from Willow Mesa. Some groups will be visible along approximately 0.5 miles of the Perfecto Ceek Road. Other groups will be visible from the proposed closed Perfecto Creek Spur, Chavez Spur, and Chavez BR2 Roads. Aspen rehabilitation cutting is proposed in both Alternatives 2 and 3. These units will not be visible from Willow Mesa due to their relative position. The units slopes away from Willow Mesa on an gradual east facing bench.

While traveling on the Perfecto Creek Spur Road, Chavez BR1 Road (NFSR 794.2C), and Chavez BR2 Road (NFSR 794.2D), past timber sale activities (ten partial clearcut units in the 1960s) are very visible due to the relatively square or rectangular shape of each harvest unit. Both alternative 2 and 3 propose to locate group selection groups along and around four of the partial clearcut units to “feather” and blend the old cutting unit boundaries with the surrounding mature forest cover. This will soften the square

shaped unit boundaries, and accelerate blending. As a result, visual quality will improve, moving from maximum modification to modification.

Currently, there are no known motorized routes encroaching into the La Garita Wilderness. Due to the relatively steep and rocky nature of the wilderness boundary, no future encroachment is anticipated activities associated with Alternative 2 or 3.

Cumulative Effects

The effects of this project on recreation within the area will be temporary, mainly during operations. Given the short lived nature of recreation impacts, and the other items discussed above, there will not be any significant cumulative effects resulting from this project.

Rangeland Resources

RANGE ALLOTMENTS

Affected Environment

The Perfecto Creek Timber Sale lies with in the Cochetopa Grazing Allotment. The Cochetopa Allotment has a varied history of use; prior to 1989 the Cochetopa Allotment was 3 separate allotments, San Luis, Baldy Chato and Cochetopa Allotments. Prior to 1976 these allotments ran sheep with Cochetopa the last to convert to cattle that year. In the 1980's all three allotments had the same permittee, the herds were combined and the cattle run through all three allotments as one herd. In 1989 they were officially combined into one allotment.

Between 1976 and 1983 as many as 1,000 yearling cattle utilized the allotment. Yearling cattle proved difficult to control and had a high incidence of brisket disease which led to the conversion to a cow/calf operation in 1983. It was at that time the allotment was reduced from 2,198 cow/calf unit months to 1,500 cow/calf unit months.

The allotment continued to have conflicts in and grazing problems in some of the drainages and was further reduced to 1,300 cow/calf units in 1989. Currently this allotment is scheduled for a new Environmental Analysis to address grazing. This Environmental Analysis is to be completed in 2007.

The Allotment today is managed in a deferred rotation system utilizing 10 pastures. During part of the grazing season the two pastures are used simultaneously. The reason is that several pastures are too small to be utilized by 428 cows and calves.

Over the last 6 years, season and numbers of cattle grazing have varied due to drought. In addition pastures from the nearby Los Pinos Forage Reserve Allotment have been available for grazing. These changes have allowed the allotment to meet the Forest Plan Grazing Standards during dry years while providing the permittees a majority of their permitted grazing season and numbers.

The Perfecto Timber Sale as proposed is within 4 pastures of the Cochetopa Allotment. The pastures are Perfecto, Pauline, Upper Chavez, and Nutras Creek. Upper Chavez and Perfecto contain most of the harvesting activity with Pauline and Nutras having less than 2 harvest units.

The Perfecto and Nutras pastures are normally used between 8 and 15 days each with 100 pairs between the first part of July and September. The Pauline and Upper Chavez pastures are used approximately 10 days each with up to 428 pairs. Grazing of these pastures can occur any time during the season.

Forage production for livestock comes from grasslands, meadows, riparian areas, aspen stands, and old harvest units. Harvest units are considered transitional range.

Transitional range will produce forage until the tree canopy becomes closed enough that most of the forage producing plants are shaded out. The number of years it takes to close the canopy varies greatly depending on the soils, the amount and species of trees cut, and how quickly those trees reestablish. See the Map 2 and 3, Appendix A.

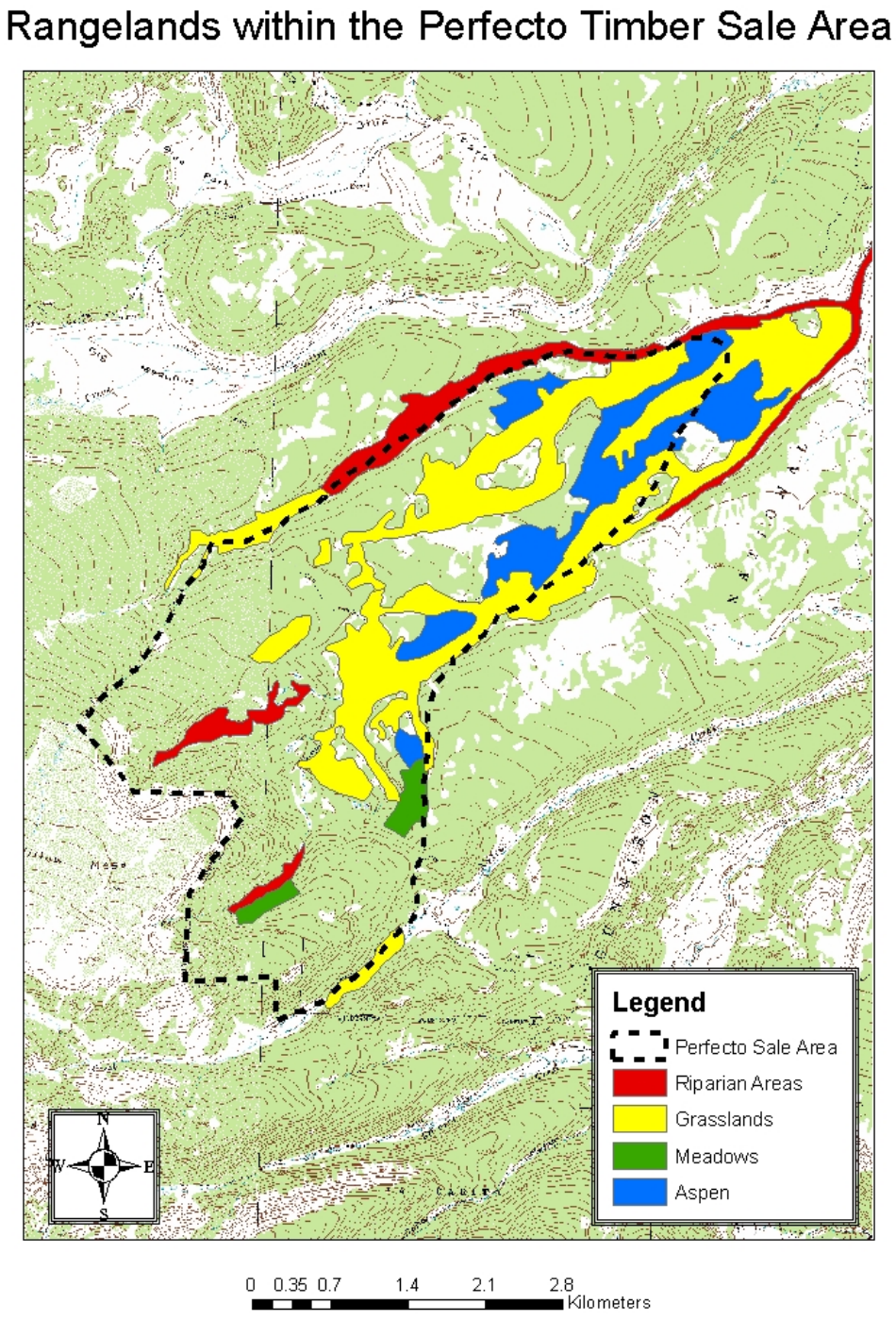

Figure 4 – Rangelands within the Perfecto Creek Project Area

Grasslands provide most of the forage within the project area. These grasslands are dominated by Thurber fescue or Arizona fescue. The latest range analysis shows that these grasslands are in good condition with a stable or upward trend.

There are two areas of wet meadows mapped within the project area. Both of these have some forest cover. These meadows are dominated by carex species and are in good condition with a stable trend.

Riparian areas within the project area are associated with water courses and are dominated by willow species with and understory of carex. All but the lower part of Perfecto and Chavez Creeks were identified as being in fair condition with and upward trend. The remaining riparian areas are in good condition with a stable trend.

Aspen stands within the project area are dominated with Thurber fescue in the understory. These stands have a good range condition with and upward trend. However, it is important to point out that a range condition rating does not consider the tree canopy in its determination.

Environmental Consequences

Alternative 1 – No Action

Under this alternative range livestock grazing would continue as is until a new grazing analysis is completed. This NEPA analysis will be developed based upon existing conditions and projected projects that could effect grazing. The transitory range that is currently included in the allotment will continue to decrease over time as tree canopy covers increase shading out forage plants. Lack of any new timber harvesting will prevent any new transition range.

Alternative 2 – Proposed Action

Under this alternative we would see some short term effects to livestock management. As units are cut that involve a fence line are harvested, livestock control will be impacted. Livestock may return to already grazed areas and over grazing could occur. Costs to the grazing permittee would increase with additional time spent ensuring cattle are in the proper place.

Active logging will tend to displace cattle away from that activity. If the activity is in a forage area this would reduce the amount of available forage. Depending on the size of the pasture, the length of time the activity is going on will determine how other areas of the pasture or allotment are affected.

By limiting how many pastures have harvest activities occurring and how much fence is breached at one time, disruption of grazing can be limited.

Long term transitory range would continue to be available. Most of the transitory range would be associated with the shelterwood and aspen rehabilitation areas where canopy cover of the stand is reduced. Range analysis done on the Cochetopa allotment shows that the old shelterwood cuts produced up to 0.2 aums/acre. Looking at 54 acres of shelterwood and 40 acres of conifer removal for aspen improvement, we could expect up to 19 aum's of additional forage. With the current permitted numbers of 428 cows with calves that would be 1-day of additional forage.

The group selection units will see some increase in forage in the areas of the group removal and along some skid trails. This forage would only be available to livestock if they find it. Experience with other timber sales shows that cattle use of these groups is variable depending on factors such as slope, down material, ability to travel along the skid trails, distance from water, and distance from other grazing areas.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Effects to the range resource would be similar to alternative 2. We expect to see short term impacts to livestock from the harvesting and road activities. Harvest units with fences that are breeched to facilitate the harvest would have the same effects as in alternative 2.

Transitory range would be slightly different than alternative 2 with the addition of an additional 67 acres of aspen regeneration cutting. Using the same prediction as in alternative 2 we can expect to see approximately 32 AUM's of additional forage available or less than two days of available forage with the current permitted numbers.

Cumulative Effects

Alternative 1 – No Action
Actions that could be anticipated over time are limited in this part of the district. With this area being near the headwaters which are within the La Garita Wilderness Area there will be no land or vegetation treatments up stream form this area. Currently there are no actions planned down-stream that would impact the rangeland resources in this area. The impacts expected would be from an increase in recreation that could affect cattle use. In other areas of the district we see that livestock are sometimes displaced from areas with high concentrations of human activity.

Alternative 2 – Proposed Action
Actions that could be anticipated over time are limited in this part of the Gunnison Ranger District. With this area being near the headwaters which are within the La Garita Wilderness Area there will be no land or vegetation treatments up stream form this area. Currently there are no known actions planned down stream that would impact the rangeland resources in this area. The impacts expected would be from an increase in recreation that could affect cattle use. In other areas of the district we see that livestock are sometimes displaced from areas with high concentrations of human activity.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Actions that could be anticipated over time are limited in this part of the Gunnison Ranger District. With this area being near the headwaters which are within the La Garita Wilderness Area there will be no land or vegetation treatments up stream form this area. Currently there are no known actions planned down stream that would impact the rangeland resources in this area. The impacts expected would be from an increase in recreation that could affect cattle use. In other areas of the district we see that livestock are sometimes displaced from areas with high concentrations of human activity

NOXIOUS WEEDS

Affected Environment

In 2003, in cooperation with the Gunnison Basin Weed District a survey for noxious weeds was done along most of the major forest roads. The results of that survey show that there were no noxious weed populations found in the project area along these major roads. However, there are known infestations of Canada thistle (Cirsium arvense) within the project area associated with old roads, skid trails and landings.

Outside of the project area along Forest Roads NFSR 738, 794, and 794.2 the following weeds have been identified: Canada thistle (Cirsium arvense), Yellow toadflax, (*Linaria vulgaris*), and field bindweed (*Convolvulus arvensis L.*). The yellow toad flax site has been treated and no new growth identified. Continued monitoring and treatment as needed of this infestation will reduce the probability of new infestations from this site.

Currently, Canada thistle within the project area has not been sprayed. Noxious weed dollars have been used to treat more aggressive weeds within other parts of the Gunnison Basin. The known road side locations have been treated yearly under an agreement with the Gunnison Basin Weed District.

Reduction in the spread of existing noxious weed infestations and prevention of new weed species can be accomplished by ensuring that all equipment associated with any ground disturbing activity is thoroughly cleaned before coming upon the National Forest.

Below is a map of the project area showing the approximate locations of noxious weed infestations within the vicinity of the project area boundary (Figure 5). More detail of each infestation is available from the Gunnison Ranger District.

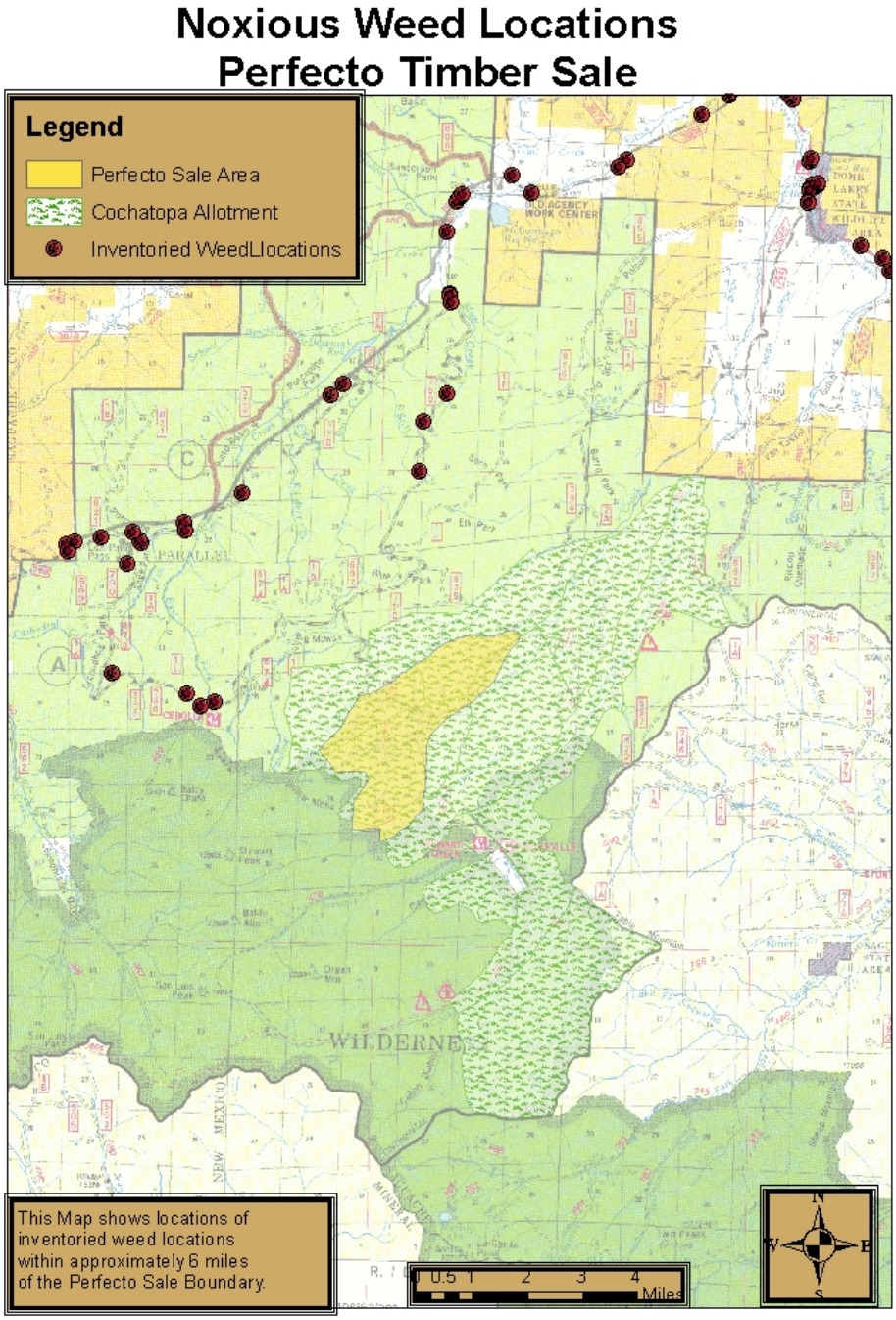

Figure 5, Noxious Weed Locations in the Vicinity of the Perfecto Creek Timber Sale Area

Environmental Consequences

It can be expected that field bindweed and Canada thistle will move further out into the forest unless the access roads are successful treated and noxious weeds eliminated. Establishment of new weed infestations is associated with construction, vehicles, road maintenance, recreation, hunters, and improper livestock grazing. Weed transport may occur from wind, water, tires, people, and animals. (Troublesome Weeds of the Rocky Mountain West.)

Alternative 1 – No Action

Under this alternative of no harvest activities at this time it can be expected that this will have the least amount of noxious weed infestations. Without any ground disturbing activities at this time, new infestations and expansion of existing infestations will be the least of any of the alternatives. Noxious weed spread will continue at current levels. Treatment of existing infestations in this area will continue to be prioritized with infestations over the entire district. The opportunity to fund intensive weed surveys and treatments within the project are will be forgone with Alternative 1, unless other funding becomes available (see K-V funded project area improvement list, Chapter 1).

Alternative 2 – Proposed Action

Not all noxious weeds or infestations establish on disturbed sites, a correlation exists between disturbed ground that occurs within an activity area. More disturbed ground will create a higher risk of an invasive weed infestation. This alternative has the most ground disturbance of all the alternatives and has the highest risk of weed establishment.

With this project there is an opportunity for, money to be collected and later used to implement an integrated weed management strategy for invasive species infestations. This KV money when collected can be used over many years and could lead to more weed treatment in the area than alternative 1 the no action alternative.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement

This alternative would be similar to Alternative 2 but, with fewer acres potentially disturbed, the result would be less acres at risk of infestation. Use of KV collected money for implementation of an integrated weed strategy would also be available with the same effects as in alternative 2.

Cumulative Effects

Alternative 1 – No Action

Actions that could be anticipated over time are limited in this part of the Gunnison Ranger District. With this area being near the headwaters which are within the La Garita Wilderness Area there will be no land or vegetation treatments up stream form this area. Currently there are no known actions planned down stream that would impact the rangeland resources in this area. The impacts expected would be from a continuing increase in recreation that could affect noxious weed establishment. New weed

infestations will continue to become established and distributed by wheeled vehicles and people.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement

Actions that could be anticipated over time are limited in this part of the Gunnison Ranger District. With this area being near the headwaters which are within the La Garita Wilderness Area there will be no land or vegetation treatments up stream from this area. Currently, there are no known actions planned down stream that would impact the rangeland resources in this area. The impacts expected would be from a continuing increase in recreation, potential wildfire events, and future timber sale treatments that could increase noxious weed establishment. New weed infestations are likely to continue to become established and moved around by wheeled vehicles and people. With the weed survey and treatment proposed for both action alternatives it is not expected that weeds established on disturbed sites within the project area will spread beyond the initial infestation (if establishment occurs at all). After the first few seasons from the initial harvest disturbance, sites will stabilize with natural ground cover and the risk of weed establishment will be significantly reduced. Given that past disturbance from timber harvest and other activities has not resulted in significant establishment of weed populations and the practices proposed for this timber sale (equipment cleaning, re-vegetation, weed survey & treatment), it is not likely that the cumulative impact will result in a major increase in noxious weed establishment or spread.

Rare, Sensitive or Endangered Plants

Affected Environment

Threatened, endangered and proposed plants were not surveyed within the Perfecto Creek project area. The only known threatened, endangered, or proposed plant on the Grand Mesa, Uncompahgre and Gunnison National Forests is the Uinta Basin Hookless Cactus (*Sclerocactus glaucus*). This plant is only found at low elevations well below this project area.

Sensitive plants were surveyed for on September 17, 2004. Prior to the survey the R-2 TES plant list was reviewed to help determine which species on the list could have habitat within the project area. Aerial photos were looked at to identify these potential habitat areas. The survey that was done did look at all of these areas as well as parts of the project between these areas. Mark Hatcher of the Gunnison Ranger District completed the plant survey. No plants that are listed on the Region 2 TES list were found to occur within the project area. For detailed information please refer to the Plant Biological Evaluation.

Listed below are the sensitive species that were considered when identifying potential habitat within the project area.

Table 26 – Sensitive Plant Species

Scientific Name	Common Name	Location	Habitat	Suitable habitat present in sale area?
Botrychium multifidum var. *coulteri*	leathery grapefern	RIP, FM, LP transition 8,000-9,500 ft.	Old pasture, meadows, woodland margins, riverbanks, bottomland, RIP habitat generalist.	YES
Braya glabella	arctic braya	AL 12,000-13,000 ft.	Alpine tundra on calcareous gravelly soils.	NO
Cirsium perplexans	Rocky Mountain thistle	MS, PP below 8,500 ft.	Dry clay/shale hillsides. Soap Creek?	NO
Drosera rotundifolia	round leaf sundew	FEN 9100 to 10,000 ft.	Fens, floating peat mats with Sphagnum moss	NO
Eriophorum altaicum var. *neogaeum*	Altai cottongrass	FEN 9,500-14,000 ft.	Fens, wetlands	YES
Eriophorum chamissonis	Chamisso's cottongrass	FEN 9,500-14,000 ft.	Alpine Fens, wetlands	NO
Eriophorum gracile	slender cotton grass	FEN 8,100-12,000 ft	Sedge meadows and floating peat mats, saturated soil to shallow water. Known,1 site West Elk Wilderness.	POSSIBLE
Gilia sedifolia	stonecrop gilia	AL above 10,500 ft.	Alpine tundra.	NO

Scientific Name	Common Name	Location	Habitat	Suitable habitat present in sale area?
Kobresia simpliciuscula	simple bog sedge	AL, FEN	Alpine areas including tundra, calcareous fens and moist gravel.	NO
Machaeranthera coloradoensis	Colorado tansy aster	MS, AL, PP 8,500-12,500 ft.	Gravelly places in mtn parks, dry tundra, sandstone / limestone.	YES
Ranunculus gelidus (*R. karelinii*)	ice cold buttercup, tundra buttercup	AL 11,000-14,100 ft.	Ridgetops and peaks, in rocks and scree, where there have been low-lying snow banks or in the rivulets below them, 11,000-14,100 ft	NO
Salix candida	hoary willow	FEN, RIP 8,800-10,600 ft.	Fens, edges of streams, wetlands.	YES
Salix myrtillifolia	blueberry willow	RIP, FENS 9,000 – 10,500ft.	Wetlands, streambanks, fens.	YES
Salix serissima	autumn willow	FEN 7,800-10,200 FT.	Marshes, fens.	NO
Utricularia minor	lesser bladderpod	FEN, AQ 8,600-10,500 ft.	Shallow fens, fresh H2O wetland, subalpine ponds	YES

SF=Spruce Fir**, AS**=Aspen**, LP**=Lodgepole Pine**, MS**=Mountain Shrub**, SA**=Sagebrush, **GL**=Grassland**, FM** = Forest Meadow**, FEN**= Peat fen**, AL**=Alpine**, SU**=Subalpine, **RIP**=Riparian/Wetland**, AQ**=Aquatic**, RO**=Rock/Cliff/Cave/Canyon/Mines**, PP**=Ponderosa Pine, **CON** = Mix Conifer Forest

Habitat within the project area includes spruce-fir, aspen, lodgepole pine, grassland, forest meadow, subalpine, riparian/wetland, rock, and mixed conifer. Those plants that do not meet these broad habitat types do not have the potential of being in the project area. The species identified as having habitat or potential habitat were surveyed for. Following is general information on those species that have habitat within the project area.

Botrychium multifidum var. *coulteri* / .leathery grape fern, This species is more widespread outside of Colorado. The Colorado Natural Heritage program rates B. Multifidum as S1, indicating that it is extremely uncommon and localized within the state. Range wide this species occurs in a variety of habitats, including old pastures, meadows, woodland margins, riverbanks, and bottomlands (Lellinger 1985). Weber (1990) reports it from 'mountain meadows" in Colorado.

Eriophorum altaicum var. *neogaeum* / Altai cottongrass or White-bristle cottongrass. This species is a perennial Cyperaceae. It grows in wetlands from elevations of 9,500 ft or higher. It reaches it most southern distribution in Colorado and has been found in

Gunnison and Saguache counties. The species has a global rank of G4T indicating that the subspecies is secure globally but rare in parts of its range. The species is considered critically imperiled in Colorado with an S2 ranking.

Eriophorum gracile / slender cotton grass. This perennial sedge grows in montane and subalpine wetlands as well set meadows and pond edges. This species is common in Alaska, Canada and the northern states. Colorado is where it reaches its southern most distribution. The nearest known occurrence within the Gunnison District is over 35 miles to the northwest in the West Elk Wilderness. The species is secure globally but imperiled in Colorado with an S2 ranking.

Machaeranthera coloradoensis is a regional endemic species with populations located in central, west central, and southwestern Colorado and south-central Wyoming. It is a perennial forb species that occurs in a variety of habitats from montane to alpine areas. Of the 33 occurrences of *M. coloradoensis* worldwide, 21 occurrences are on lands managed by the U.S. Forest Service in Colorado and Wyoming. *M. coloradoensis* has been ranked by the Colorado Natural Heritage Program as S2, or imperiled (vulnerable to extirpation; endangered or threatened in the state) and by the Wyoming Natural Diversity Database as S1, or critically imperiled (vulnerable to extirpation in state; critically endangered in state). Tansyaster is a low or prostrate growing mat-plant. The heads are individual on short peduncles or stalks. This species occurs in high dry mountain meadows in the subalpine and alpine tundra. It grows on gravelly dry sites and is often associated with Arizona fescue (*Festuca arizonica*).

Salix candida / hoary willow or sageleaf willow. This woody shrub of the willow family (Salicaceae) is found along pond and stream edges or fens or wetlands. It is common across the northern tier states and in Canada and Alaska. Colorado is its southernmost distribution where it has a rank of S1. It has been found in Gunnison and Hinsdale counties but not in Saguache County where this sale is located.

Utricularia minor / lesser bladderpod. This plant is a carnivorous free-floating aquatic which produces winter buds for vegetative reproduction as well as seeds. This species is circumboreal but rare across its range with only a few known sites within Colorado. It's habitat is patchy and discontinuous. It can be found submerged in fens, shallow ponds, lakes and slow-moving streams. Weber reports this species is expected on the western slope of CO.

Environmental Consequences

Alternative 1 – No Action
Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
The findings in the plant related Biological Evaluation were **"No effect"** under any alternative. These findings are due to the fact that habitat is limited within the project area, wetlands and riparian areas are avoided, and that the field survey found no occurrences of any TEP&S plants.

Cumulative Effects

No cumulative, adverse effects to rare, sensitive or endangered plants are expected to result from the implementation of any alternative analyzed in this EA.

Soil Resources

Affected Environment

Soils within the Proposed Treatment Areas

The soils data that is available is found in the "Cochetopa Soil Survey". This information was gathered as part of the National Cooperative Soil Survey. Soils information was gathered during the late 1980's through the early 1990's, with a final correlation by the Natural Resource Conservation Service (NRCS) in 2000. The survey was conducted at a Level III intensity, with mapping units being identified as complexes of soil families and some series.

From this soil survey information it was found that the following dominant soil units occur within the project area not all these soil units would be directly impacted by protected harvest activities. Note: The following are soil descriptors. Harvest activity would not occur on slopes that average greater than 40%.

List of Major Soils within Proposed Perfecto Project Area

106 -- Cryaquolls - Borohemists complex, 0 to 5 percent slopes.	**1.7%**
108 -- Cryolls - Cryaquolls association, 0 to 15 percent slopes	**0.6%**
113 -- Goosepeak, cool - Seitz complex, 5 to 25 percent slopes	**39.5%**
123-- Leighcan gravelly sandy loam, 5 to 25 percent slopes	**33.0%**
135 -- Rock outcrop and Rubble land	**0.8%**
137 -- Seitz gravelly sandy clay loam, 15 to 65 percent slopes	**6.7%**
142-- Tellura, moist - Quander complex, 5 to 25 percent slopes	**16.6%**

During various field trips in 2005 and during the period of time the soil survey activities were occruing various locations were sampled with hand dug observation holes. The soil characteristics observed appeared to match the soil mapping and descriptions in the Cochetopa Soil Survey Area.

Soil unit # 113 the Goosepeak-Seitz Complex, and soil unit # 123 Leighcan gravelly sandy loam make up a majority of the soils within the proposed treatment boundaries. These soils will be impacted the most. These two soil units have formed from the the extrusive igneous material of the area (ash flowtuffs, breccias and other similar material). The Goosepeak and Seitz soils are both light colored and deep (with total depth ranging from 40-60+ inches). They typically may have an organic layer of duff material up to 2 inches thick. Beneath the organic layer the Goosepeak soil has a gravelly loam surface

ranging up to 11 inches thick grading into very cobbly to extremely cobbly clay loam subsoils. The Seitz soil will have gravelly and very gravelly sandy clay loam surfaces, grading into layering of very gravelly clay to very gravelly sandy clay loam, with a gravelly sandy loam at depths below 40 inches inches thick. These soils have for the most part greater than 35% coarse fragments in the subsoil ranging in size from gravel, cobble and stone. These soils are only slightly suceptable to rutting and compaction. For the most part they exhibit a low risk to erosion when disturbed, however, field observations have noted that the Seitz soil may form gullies if water is allowed to form concentrated flow patterns. The Soil unit #123 Leighcan gravelly sandy loam has also formed from the extrusive igneous geologic material in the area. This soil however exhibits less development, which is expressed as a coarser textured subsoil. The surface of the Leighcan is typically a gravelly sandy loam for about 4 inches, this grades into a very gravelly sandy loam which extends throughout the rest of the profile. This soil also contains more than 35% coarse fragments which occur mainly as fine to medium sized gravel. This soil has a moderate suceptability to rutting and compaction. As with unit #113 the soil has a low risk for erosion on gentle terrain, however, as the slope increases so does the risk for erosion, to the point that it may also be susceptible to gully formation and possibly slope wash as slopes approach the upper portions of this units slope range.

Another soil unit that makes up only a small percentage of the project area but may be impacted is the unit #137, which is a unit that just contains the Seitz soil on steeper terrain. This unit may experience moderate to high erosion risks on slopes above 25-30%. This unit also is moderately suscepitble to rutting and compaction if moist.

Soil Unit #142 contains the Tellura and Quander soils and occurs in the grass park portions of the project area. These soils are dark colored soils deep soils with gravelly clay loams and loam surfaces. They also have more than 35% coarse fragments within their profiles, as gravels and cobbles. The Tellura portion of this unit is especially fine textured, with the matrix being clay. This unit is highly susceptable to rutting and compaction. Activities on this unit should be carefully planned, because it can exhibit a high erosion hazard if large areas are disturbed.

The soil units #106 and #108 are both wetland soil units and will exhibit high potentials for rutting and compaction. The Cryohemist portion of unit #106 has the potential of being a Fen. All planning and design of this project will avoid impacts to these soil units.

Another soil unit, Unit #135, that occurs within the proposed project area accounts for a very small percentage and would be avoided for the reason of having steep and rocky conditions. A table of all pertinent soil characterisics gathered from the Cochetopa Soil Survey and the National Soil Information System (NASIS) database is on file in the project record.

Environmental Consequences

Alternative 1 – No Action

Since no soil disturbing activities would occur under this alternative there would be no potential impact to the soil resource. The opportunity for decommissioning of 0.3 miles of road will be lost for the time being.

Alternative 2 – Proposed Action

Timber harvest activities in general have the potential to affect soil productivity. The use of heavy logging equipment usually has the potential to cause the greatest disturbance. This is due to the weight, horsepower and torque involved with the heavy equipment. The potential is greatest when the soil is wet and saturated or large amounts of soil is exposed, especially on steep slopes. The scraping, sheering, blading and operating on the soil surface can lead to alteration of soil structure through rutting, displacement and compaction. The resultant exposure of the soil surface on steeper slopes, specifically on roads and trails can result in the loss of soil and soil nutrients from erosion. The degree of impact to the soils resource is directly related to the moisture conditions of the soil, the amount of organic matter along with duff, slash and understory materials on the site and the amount of area disturbed by road building and other harvest activity. Generally, we have found with past activities on similar sites that over a majority of the area there is enough material actually left on the ground in the form of slash, understory vegetation and organic matter to provide a protective cover for the soil. This, coupled with a roughing of the surface by the logging equipment results in a situation that is not conducive to large scale erosion. However, heavily used skid trails and temporary road construction creates the potential for soil erosion and sedimentation, because the soil is completely bared with, in most cases no protective cover. To reduce the potential for adverse impacts, road construction and maintenance would include the use of erosion-control structures plus practices designed to control water runoff and erosion on roads and other disturbed areas. Water control structures or practices include natural drainage, drainage dips, waterbars, and culverts. These water controls would be constructed and in place before these roads would be used for timber harvest activities. Disturbed areas would be hydrologically disconnected from any direct flow into the stream network.

In this alternative there would be 910 acres of some form of soil disturbance relating to the silvicultural activities. For the most part activity would occur on areas with low erosion hazard potentials. However, harvest unit #5 occurs mostly on Soil unit #137, and based on GIS analysis may contain 81 acres in the slope range of 15-25%. Based on the soil characteristics, a portion of that unit may have a high risk for erosion. Special attention and care will also be given to treatment units 10,12 and 13. Based on the GIS evaluation, they all contain portions of soil unit #123, which may exhibit some moderate to high erosion risks. With the use of the soil protection measures designed into the project (design criteria), all these risks will be reduced to acceptable levels.

Again with the GIS analysis, Treatment units 9 and 10 are rather close to soil unit #106, which is a wetland with a potential for conatining a fen. Careful layout, planning and contract administration will assure these wetland are not impacted.
This action will need 0.2 miles of a temporary road, which is a soil impact, however temporary roads would be decommissioned immediately following timber sale activities, as detailed in the alternative description portion of Chapter 2. Waterbarring and reseeding on these disturbed sites and buffers provided through adhering to best managemant practices standards would keep detrimental erosion impacts associated with the proposed road system to within acceptable limits.

Even though most of the soils involved possess mostly a slight risk for rutting and compaction to reduce even further the potential for rutting and compaction, close contract administration would monitor soil moisture conditions and halt operations when soil moisture conditions are such that there would be a potential for severe rutting and compaction to occur.

Forest Service watershed best management practices allow cumulatively no more than 15 % of an area to be detrimentally impacted. Detrimental soil displacement and erosion as well as rutting and compaction would be kept to within soil quality standards under all alternatives by using the specific mitigating actions described in the Watershed Conservation Practices Handbook and by adhering to Forest Plan standards and guidelines. The result would be no appreciable impact to long-term soil productivity.

Benefits to the soil resource would occur where road decommissioning takes place under these action alternatives.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Most of the impacts to the soil resource discussed in Alternative 2 will occur in Alternative 3. Based on the GIS analysis, there will be 780 acres of soil disturbed for these silvicultural activities. This alternative eliminates treatment on the soil unit #137.

Cumulative Effects

Alternative 1 – No Action
Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Past activities within the Perfecto project area include harvesting by the clearcut method that took place during the 1960's. Refer to the silviculture section of this chapter for a discussion of historical activities in the area. Sites that were clearcut approximately 40 years ago have long since stabilized to the point where erosion, soil productivity and compaction are not considered to be issues when evaluated in conjunction with actions proposed through the Perfecto Creek project. Other more recent vegetation management activities that have occurred in the project area have remained within allowable standards for maintaining the quality of the soil resource. An estimated 1.25 miles of temporary road construction would be needed to access forest stands to be harvested. These

activities when considered cumulatively with actions and design criteria proposed here pose no negative long-term effects to soil resources.

Soil resources in the project area would be enhanced under both action alternatives. These alternatives propose to reconstruct approximately 6.6 miles of existing roads to improve safety, drainage, alignment, and to apply spot surface material.

The Perfecto Creek project would close and place into storage approximately 3.2 miles of existing roads when the project is completed to reduce erosion, maintenance costs, and open road densities in the project area.

The proposal would also decommission an unneeded 0.3-mile section of NFSR 794.2H.

Geologic Hazard

No major geologic hazard are known to exist in this activity area. During field investigations no on the ground evidence of current slope movements, slumping or landslides were observed. Likewise, no obviously leaning trees were noted that would indicate slope instability.

Watershed, Fisheries and Riparian

Affected Environment

The Perfecto Timber Sale Area is located in the headwaters of the Upper Cochetopa Creek 6th level HUC. The majority of proposed land treatments are located between Perfecto Creek and Chavez Creek, which are a part of the 19,000 acre Pauline Creek Watershed. One proposed treatment unit lies within the Nutras Creek watershed. Drainages flow from generally southwest towards the northeast.

Elevations range within the project area from 9,500 feet at the confluence of Perfecto and Chavez Creeks up to 11,500 feet near the La Garita Wilderness boundary. Winters are long, summers are dry and growing seasons are relatively short. These watersheds tend to lie in a rain shadow created by the high peaks to the west. The higher elevations may average 30 or more inches of precipitation a year, while the lower elevations in these drainages get less than 20 inches annually. This area of the Forest is drier than other areas of similar elevation. Summer thunderstorms, while infrequent, can be intense and are capable of generating erosion in areas where surface water flow is concentrated. These basins are oriented towards the northeast and have elongated shapes, which tends to make the stream network less prone to large peak flow events following a significant rainfall event. Mean annual flows, and therefore baseline water yield, can be estimated using basin characteristics and regression equations developed by the U.S. Geological Service (Kirchner, et al, 1985). Coefficients of increases to yields and recovery following removal of forest cover were developed for the initial GMUG Forest Plan (1983). Most of the annual runoff is produced on lands above 11,000 feet. This represents approximately 25% of the analysis area and the estimated annul runoff is 14 inches. This is the difference between the annual precipitation gain and the evapo-transpiration losses.

The topography within the analysis area is characterized by nearly flat to gently sloping uplands located between broad glaciated valleys. The landforms get considerably steeper at the western end of the analysis area above 11,000 feet. The combination of landform, geologic/fluvial processes and beavers has created extensive riparian areas and wetlands. Most of these are associated with alluvial non-timbered valleybottoms and sub-irrigated meadows (See Map 5 - Riparian and Wetlands Map, Appendix A). Terrain dissection and drainage densities are low to moderate in the Pauline watershed compared to other watersheds in the Gunnison Basin. Drainage densities were calculated at 2.1 miles of stream per square mile of watershed. On the GMUG NF, 97% of the drainage densities are between 1.8 and 5.4 miles/sq-mi. Lower stream densities are indicative of watersheds that tend to have less surface runoff and less sediment export. Often water moves via subsurface paths to surface drainages or moves directly down into groundwater aquifers. These watersheds are less prone to flashy conditions and flow patterns over the annual hydrograph are more stable. They also tend to be less responsive to ground disturbances that result in increased surface runoff and sediment production. This condition is reinforced by the fact that while principal streams tend to be small there is a high percentage that provides perennial flow. In the Pauline watershed 51% of the total

stream miles are perennial, which is quite high. Pauline, Chavez and Nutras Creeks are small perennial streams. The base flows in Pauline, Chavez and Nutras are all on the order of 1 to 3 cubic feet per second, with bankful widths ranging from 2 to 4 feet; and bankful depths less than 10 inches in the riffle sections. These estimates come from Forest Service observations and not measured surveys, the exception being the Chavez Creek aquatic habitat survey conducted on September 11, 2004.

The Forest has completed a course assessment of watershed sensitivity and condition across the Forest in conjunction with the preparation of a comprehensive assessment that is part of the set of planning documents for Forest Plan revision. The sensitivity of a watershed is an estimation of its potential response to current or future land disturbances, both natural or management related. The variables selected to characterize sensitivity are related to sediment and runoff generation, and subsequent routing through the channel network. They reflect inherent physical factors, which are not subject to short-term change or modification (geologic parent materials, landforms, topography and climate). After integrating these factors a ranking analysis was conducted and then the results were stratified into 4 classes. Class 1 watersheds are the least sensitive, while Class 4 watersheds are the most sensitive. The Upper Cochetopa Creek watershed was assigned a Class 3 sensitivity. The high rainfall intensity factor was the reason this watershed received a Class 3 designation, rather than a lesser sensitivity class.

The influence of past land-use activities on watershed function was also addressed in the comprehensive assessment document. In order to conduct this analysis there had to be comparable data across the entire Forest. Those activities or facilities that were considered included: water diversions and storage projects; motorized travel routes and stream crossings; timber treatments and fire; abandoned mines; and private land inholdings. Inclusion of grazing effects would have been desirable but there was no way to quantify that across the Forest. Each of these factors was used additively and the cumulative totals stratified once again into Class 1 (least) through 4 (most). The Upper Cochetopa Watershed is a Class 2, meaning at the watershed scale activities have likely had little to no influence on runoff, water quality or flow regime. Timber treatments and roads are more prevalent than any of the other factors considered.

Field reconnaissance of the proposed treatment area and associated aquatic and watershed conditions was conducted by the Forest Hydrologist on two separate occasions, once in September 2004 and again in September 2005. Specific attention was directed towards access routes, stream corridors and within proposed treatment areas. Streams within the analysis area appear to be fully functioning and providing the full spectrum of resource benefits. Except for drainage crossings the majority of roads are located well up on the hillslopes or benches between drainages. No water quality data was collected in conjunction with this project, because there was no reason to suspect a problem. These waters are of excellent quality and fully meeting classification requirements for their designated uses of aquatic life 1, recreation 2, water supply and agriculture. There are some relic indications of rill and gully erosion that was likely associated with runoff from roads and historic heavy grazing on lower productivity upland slopes. Over the last 10 years considerable effort has been made to disconnect the road network from surface

drainages, remove abandon crossings, improve riparian conditions through livestock management adjustments and close unauthorized travel routes.

Fish-bearing streams are located in the analysis area adjacent to units 5, 10, 13A, and downstream of the timber sale project area. Perfecto and Chavez Creeks were sampled for fish in September of 2004. Brook and brown trout were the only fish sampled in this area (Table 27). Several age classes were observed while sampling indicating healthy, reproducing populations of resident brook and brown trout. Brook trout were observed spawning in both streams.

Colorado River cutthroat trout (CRCT), a Region 2 sensitive species were not observed in the sampling area. Historically, CRCT have been observed in Chavez Creek in a series of beaver ponds located approximately 1/2 mile above the NFSR 794 stream crossing. DOW stocking records indicate that these ponds were stocked in 1982. Additionally, stocking records of CRCT and other non-native cutthroat trout have been documented annually between 1987-1994 (CDOW 2003). Based on recent samples, re-establishment of CRCT in Chavez Creek has not been very successful. The presence of brook and brown trout are believed to be the reason for the unsuccessful re-establishment of CRCT in these streams. Competition with non-native trout is considered to be the biggest threat to CRCT, and impacts to the distribution, abundance, and genetic integrity of CRCT and other native cutthroat are well documented (CRCT Task Force 2001; Gresswell 1995; Kershner 1995; McIntyre and Reiman 1995; Rinne 1995; Young 1995).

Table 27. Population estimates for sampled trout species in Chavez and Perfecto Creeks, September 2004. Estimates based on 2-pass electrofishing for fish ≥75 mm (CDOW 2002, Jakomatic ver. 1.9).

Stream Name	Chavez Creek	Chavez Creek	Chavez Creek	Chavez Creek	Perfecto Creek
Site ID	CHAV2004-1	CHAV2004-1	CHAV2004-2	CHAV2004-2	PERF2004-1
Date	9/28/2004	9/28/2004	9/28/2004	9/28/2004	9/28/2004
Common Name	Brook Trout	Brown Trout	Brook Trout	Brown Trout	Brook Trout
Minimum Size (mm)	75	75	75	75	75
No. Fish captured	39	2	52	6	34
Fish/Mile High	700	No estimate	995	114	666
Fish/Mile Low	32	No estimate	747	83	100
Lbs/Acre High	154	No estimate	114	25	159
Lbs/Acre Low	7	No estimate	86	18	24

A quantitative stream condition assessment was conducted in 2004 of the lower reaches of Chavez Creek (Table 28). A review of the area determined that riparian conditions in the area were healthy, with dense willow stands and good riparian health. Small main channel beaver ponds were observed thoughout Chavez Creek, providing good rearing and over-wintering habitat for trout. Aquatic vegetation was abundant as well, providing a good source of cover for fish. Bank stability was excellent, with limited disturbance. Fine sediment less than 2 mm composed approximately 7% of substrate sampled, indicating that available spawning substrate is probably not limited by fine sediment levels. Pebble count indicated that median particle ranges ranged between coarse gravels and small sized cobbles (32-64 mm). Riffle features dominated the reach, with a low to

moderate distribution of pools. Pool depth was rated as fair, but did not appear to limit summer or over-wintering habitat.

The abundance of beaver ponds prevented a quantitative stream condition assessment of Perfecto Creek. Visual observations indicated that the majority of Perfecto Creek consisted of large beaver dam complexes. Vegetation along the stream was healthy with an abundance of riparian woody species such as willows. Bank disturbance was more frequent than observed in Chavez Creek, in short reaches of stream not inundated by beaver dams. Summer stream flows appear to be a limiting factor for fish production in most of Perfecto Creek.

Table 28. Quantitative results from stream condition inventory for Chavez Creek, September 2004.
* denotes that parameter is estimated based on data from sampled reach.

SiteID	gmug2004-001
Stream Name	Chavez Creek
Elevation (ft)	10,720
Slope	1.90%
Estimated Flow	< 1 cfs
Sample Reach Length (m)	539.50
Total Area (m^2)	642.45
Total Volume (m^3)	142.4741
Mean Width (m)	1.3
Mean Maximum Pool Depth (m)	0.39
Mean Residual Pool Depth (m)	0.26
Mean Bank Full Width (m)	1.43
Pools/100m	3.15
Pools/Mile*	50.71
Percent Pool Area	22.29%
Percent Pool Volume	26.33%
d50 (median particle size)	45.70
Sediment < 2mm	6.80%
Total Large Wood	0
Percent of Stable Banks	99.90%

On-going activities that may currently affect fish habitat for MIS and sensitive fish species include existing road density and livestock use. Approximately, 1.5 miles per square mile of road occur within the Pauline Creek sub-watershed, which includes both Perfecto and Chavez Creeks. However, the majority of these roads are located outside the water influence zone (WIZ). Livestock management in the sub-watershed appears to be good, since riparian areas are in good health. Cumulative management activities in the Chavez and Perfecto Creek sub-watersheds are considered to have minor effects to aquatic species.

Management Indicator Species

GMUG NF LRMP Amendment for MIS species (2005) has identified the assemblage of "common trout" to evaluate management affects to aquatic ecosystems. Electrofishing samples indicate that brook and brown trout are the only MIS trout species present in the

analysis area. A review of Forest-wide fish sampling on the GMUG NF indicates that trout are widely distributed throughout the Forest. Statistics from GMUG NF LRMP suggests that there are approximately 1,200 miles of stream on the Forest that contain viable fish populations consisting of brook, rainbow, brown, and cutthroat trout. A total of 177 sites have been sampled on the GMUG NF (2001-05), revealing that trout density (fish >75mm) ranges between 10 and 4,178 fish per mile, with a mean density of 375.4 fish per mile.

WATER RESOURCES

Environmental Consequences

Alternative 1 – No Action
Without a commercial timber sale there will be no opportunity to collect KV funds for the purpose of reducing the sediment input to Chavez Creek. Also without a sale, proposed road improvements and reduction in open travel routes will not be accomplished or would have to compete for scarce appropriated funds.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
There are no tangible differences in water resource consequences between these two alternatives. They were not developed in response to watershed issues and there are no differences in either direct or indirect effects to water resources or features.

The principal harvest prescription under both alternatives is group selection. Refer to the silviculture section in this document for a full description. This treatment is prescribed for 747 acres in alternative 2 and 550 acres for alternative 3. It is estimated that harvesting will only occur on about 25% of these acres. Another 10% of the unit may be utilized as temporary travel routes to move logs to the landing or out to system roads. Another 163 acres in alternative 2 and 230 acres in alternative 3 will be treated using other prescriptions.

The likelihood of any direct or indirect impacts to aquatic resources; riparian areas; flow regimes; the channel network; or water quality is very low. The only characteristic that was identified during our watershed sensitivity assessment that would contribute to a higher sensitivity was rainfall energy. However, this factor must be integrated with the other characteristics that define erosion potential, such as slope and soils in order to draw meaningful conclusions. Reconnaissance of proposed harvest units in the field and analysis of project maps indicates that average slopes within treatments units are less than 15%. With the gentle slopes where logging operations would occur, the low drainage densities and soils that tend to absorb precipitation rather than shed it, the likelihood that changes to flow regimes; increases in sediment production and/or loss of topsoil is unlikely.

Another critical design element is the disconnecting of activity areas from the drainage network. Areas within 100 feet of perennial and intermittent drainages are being excluded from timber harvest. That being the case, in almost all instances there should be no activity within the water influence zone (WIZ). It can be anticipated that some skid trails may need to cross, but this will only be allowed when other options have been considered and determined to not be feasible or practical. Then only under agreements made between operator and the Forest Service sale inspector will those activities be allowed in the WIZ.

Roads are often the single biggest influence in a watershed upon sediment production and runoff hydrology. Roads can act as extensions of the channel network and interceptors of upland water flow patterns; thereby causing water, nutrients and pollutants to be routed out of the watershed more quickly and efficiently, which is not desirable. A symptom of healthy watersheds is the slow release of moisture over the entire annual hydrograph and retention of sediment and nutrients in either the uplands or floodplains where it contributes to productivity. The majority of roads in these watersheds do not exist in close proximity to stream network features. It is fortunate that these roads where built by the Forest Service, undoubtedly for previous timber harvesting, and have not simply evolved from user created routes. These roads were built in the proper locations with a generous buffer between road prisms and streams. Crossings of channels are at right angles and move across the floodplain by the shortest route.

There is always some potential for impacts, as under certain conditions that combine storm events occurring during a period when construction or logging operations have not completed installation of safeguards that impacts could arise. This is why an important design criterion is to stay current with road maintenance and drainage installation, and to always have sites properly prepared for anticipated storm or runoff periods.

Cumulative Effects

Alternative 1 – No Action
Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
An examination of aquatic resource conditions is the best indicator of the presence or absence of cumulative effects. The surveys and observations made indicate that aquatic resources are in robust condition. Obviously these systems are in equilibrium with their water budgets and sediment supply. The management activities and disturbance history associated with the Upper Cochetopa watershed suggests that previous timber stand treatments, grazing (both domestic and native species), and roads are the principal influences. The effects associated with private land inholdings, fire and water developments, is either minor or non-existent.

An examination of the timber records indicates that over the last 35 years activities have occurred within stands that total nearly 6,800 acres or 33% of the watershed. The 6,800 acres is far in excess of actual treatments, as very few stands have been subjected to treatment over their entire area. Using aerial photography, interpretations made of

canopy closure and stand texture, suggests that actual treatments have affected 50% or less of those 6,800 acres. Effects from ground disturbances is relatively short lived, generally less than 10 years. The one location where concerns exist, which are believed to be partially related to management activities and the influence of the road is along the southern perimeter of the project area along NFSR 794. There are a few locations where soil type, moisture limitations, and steeper slopes, have resulted in rill and gully erosion. (see watershed KV project description). Natural erosion rates in these environments are high. In addition erosion has been accelerated by losses in vegetative cover and concentration of water along both livestock trails and skid trails. Once those impacts occur recovery is very slow and difficult. The origin of these erosion features are at least 30 years old and may be much older, dating back to the early 1900's or late 1800's. All of these erosion features were observed on open hillslopes with slopes greater than 30%.

Within the high elevation forested canopy small openings can be expected to capture and retain winter snowpack and provide some incremental increases in water yield. These effects are more significant during heavy snowpack years and the effects are reduced or non-existent in drier years. Based upon proposed treatments there may be around 100 acres of openings that could contribute to some potential increase in yield. However, those increases, if and when they occur, are more likely to contribute to increases in site productivity and have very little effect on streamflows.

FISHERIES AND RIPARIAN

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect effects -

This alternative would have no direct or indirect effects to local fisheries and fish habitat since there would be no change in the current condition.

Management Indicator Species -

Aquatic Management Indicator Species would not be affected by the No Action alternative.

Region 2 Sensitive Species -

Implementation of the No Action alternative would not lead to a trend toward federal listing for Colorado River cutthroat trout since no change in baseline would occur, and existing habitat within the analysis area and downstream of the analysis area is capable of supporting CRCT.

Alternative 2 – Proposed Action

Direct effects -

The Proposed Action would have no direct effects to local fisheries and fish habitat since no management activity would occur within the Watershed Influence Zone (WIZ).

Excluding activities inside the WIZ is expected to protect fisheries habitat from direct effects associated with all silvicultural treatments and removal of commercial products.

Indirect effects -
Indirect effects to fish habitat are expected to be minimal given the size of the vegetation treatments, existing topography, and their relation to downstream fisheries. Sediment delivery to streams surrounding the project area is expected to be minimal and discountable, since activities would occur on gentle slopes, and Watershed Conservation Handbook practices would be implemented. Additionally, buffer strips (referred to as the WIZ) would be implemented along intermittent streams. Packer (1967) noted that providing streamside buffer strips below units was an effective erosion control measure to reduce sediment delivery to streams. The use of watershed influence zones (WIZ) to protect fisheries values has been documented as an effective tool in several Pacific Northwest studies (Hicks et al. 1991).

Exclusion of silvicultural activities in the WIZ is expected to maintain normal wood recruitment and nutrient input to streams within the analysis area. Habitat cover, pool depth, spawning gravels, bank stability, streamflows, and other key habitat parameters are not expected to show measurable changes following the implementation of Alternative 2.

Management Indicator Species -
This project would not affect the viability of trout species on the Forest given the size and scale of the project. Indirect effects are anticipated to be minimal and discountable and would not result in a measurable change in downstream habitat due to the projects proximity to fish-bearing streams, and relative small disturbance area when compared to the total subwatershed acres. Additionally, Perfecto, Chavez, and Nutras Creeks comprise approximately 1.0% of the total fish bearing streams on the GMUG NF. Since the indirect effects of the project are minimal, and the stream comprises such a small percent of the total habitat for trout Forest-wide, the viability of rainbow, cutthroat, brown, and brook trout would not be threatened by this project. Therefore, Alternative 2 may temporarily displace individuals or alter how individuals use affected habitat through habitat alteration and/or disturbance, but these effects will not result in a change in population numbers or trends at the project or Forest level scales.

Region 2 Sensitive Species -
CRCT may be present in the analysis area in small numbers. Implementation of alternative 2 would not lead to a trend toward federal listing for Colorado River cutthroat trout since there are no direct effects to fish habitat, and indirect effects are expected to be minimal and discountable.

Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Direct, Indirect, and Cumulative Effects -
There are no measurable differences in environmental consequences for aquatic species between Alternatives 2 and 3. Alternative 3 was not developed in response to watershed

issues or aquatic species issues. Therefore, the direct, indirect, cumulative effects for Alternative 3 are the same as Alternative 2.

Management Indicator Species -
This project would not affect the viability of trout species on the Forest given the size and scale of the project. Indirect effects are anticipated to be minimal and discountable and would not result in a measurable change in downstream habitat due to the projects proximity to fish-bearing streams, and relative small disturbance area when compared to the total subwatershed acres. Additionally, Perfecto, Chavez, and Nutras Creeks comprise approximately 1.0% of the total fish bearing streams on the GMUG NF. Since the indirect effects of the project are minimal, and the stream comprises such a small percent of the total habitat for trout Forest-wide, the viability of rainbow, cutthroat, brown, and brook trout would not be threatened by this project. Therefore, Alternative 3 may temporarily displace individuals or alter how individuals use affected habitat through habitat alteration and/or disturbance, but these effects will not result in a change in population numbers or trends at the project or Forest level scales.

Region 2 Sensitive Species -
CRCT may be present in the analysis area in small numbers. Implementation of Alternative 3 would not lead to a trend toward federal listing for Colorado River cutthroat trout since there are no direct to fish habitat, and indirect effects are expected to be minimal and discountable.

Cumulative Effects

Alternative 1 – No Action
Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Implementation of any of the possible management alternatives would not increase cumulative effects to MIS or aquatic sensitive species above the existing baseline identified in the Affected Environment.

Transportation System

Affected Environment

The Cochetopa Creek NFSR 794 is a Maintenance Level 3 surfaced single lane road with turnouts, suitable for passenger cars when dry. Perfecto Cutoff NFSR 794.2B is a local Maintenance Level 3 road which connects NFSR 794 to NFSR 790. Seasonal average daily traffic counts have recorded less than 25 vehicles per day. The National Forest provides maintenance for these roads.

Both NFSR 794 and 794.2B are under National Forest jurisdiction. The National Forest holds three easements for the Cochetopa Creek Road, including the segments through Bureau of Land Management and two private segments joining with Saguache County Road 15GG. These roads have been used in pervious years as timber haul routes.

In 1997 and 1998 the National Forest invested road maintenance and watershed funding to improve the drainage and surfacing of the Cochetopa Creek Road. Existing culverts were maintained, additional rolling dips were installed, an open bottom arch pipe was installed on Chavez Creek, and surfacing was crushed and placed to reduce sedimentation into adjacent creeks. The soils are erosive and frequent drainage is required to prevent runoff from cutting below lead out ditches and culvert outlets.

The Cochetopa Creek Road is used by a variety of forest users and provides access to the Colorado Trail, Continental Divide National Scenic Trail, Eddiesville Trailhead, Stewart Creek Trailhead, the LaGarita Wilderness, and a private land inholding. Permittees use this road for hauling cattle to the Chavez Creek corrals. Rolling dips need to be maintained to accommodate commercial cattle trucks annually prior to June 20th. Hunting is popular in the area and horse and All Terrain Vehicle (ATV) use is common.

All motorized and mechanized travel is restricted to established routes and established use. Cross-country travel by wheeled vehicles is not permitted. Wheeled-vehicle travel is not allowed on routes that have been signed as closed, blocked, ripped or otherwise decommissioned. Visitors are permitted to travel up to 300 feet off roads and trails to camp, picnic, and gather forest products - providing resource damage does not occur. Use of routes is restricted to the mode of travel consistent with established use. Road access is seasonal subject to snowfall. Spring road closures are in effect until the road surface naturally dries, which often does not occur until the end of May.

Limited use is received on the Level 2 roads by ATV's and four-wheel drive vehicles. Most of this use occurs during hunting season, occasional firewood cutting, and by grazing permit holders.

Road closures implemented in adjacent areas have been effective. However, given the parks that are interspersed throughout the project area, there is the potential for road closures to fail if they are not placed at defensible locations. The analysis team evaluated possible road closure locations for each road proposed for closure and determined that

defensible locations exist for each of these routes. Road closures will be accomplished using a combination of signing, natural barricades, physical barricades, ripping, seeding and re-contouring road prisms.

Table 29. Individual Road Information

Road Number	Road Name	Total Miles in project area	Maintenance Level
794	COCHETOPA CREEK	4.31	3 - SUITABLE FOR PASSENGER CARS
794.2A	IGNACIO PARK	0.04	2 - HIGH CLEARANCE VEHICLES
794.2B	PERFECTO CREEK	1.59	3 - SUITABLE FOR PASSENGER CARS
794.2B1	PERFECTO RIDGE SPUR B	1.41	2 - HIGH CLEARANCE VEHICLES
794.2C	CHAVEZ BR 1	0.81	1 - BASIC CUSTODIAL CARE (CLOSED)
794.2C	CHAVEZ BR 1	0.18	2 - HIGH CLEARANCE VEHICLES
794.2D	CHAVEZ BR 2	1.21	2 - HIGH CLEARANCE VEHICLES
794.2E	NUTRAS CREEK	0.25	1 - BASIC CUSTODIAL CARE (CLOSED)
794.2H	SPUR RD 794.2H	0.89	1 - BASIC CUSTODIAL CARE (CLOSED)
794.2H	SPUR RD 794.2H	1.15	2 - HIGH CLEARANCE VEHICLES
	Total	***11.83***	

Environmental Consequences

Alternative 1 – No Action

Under the No Action Alternative, the transportation system would remain the same with no changes in road location or condition in the immediate future. There would be no increased use or maintenance needs on the Cochetopa Creek Road NFSR 794. Over time the resource damage that is occurring on NFSR 794 would increase. Road densities would not be decreased.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement

These project alternatives propose to reconstruct approximately 6.6 miles of existing roads to improve safety, drainage, alignment, and to apply spot surface material. An estimated 1.25 miles of temporary road construction would be needed to access forest stands to be harvested. Although the project area currently has roads in place, some stands or portions of stands proposed for harvest are currently not adjacent to existing roads and some existing roads do not meet standard conditions necessary for safe operation. The Perfecto Creek project would close and place into storage approximately 3.2 miles of existing roads when the project is completed to reduce erosion, maintenance costs, and open road densities in the project area. These roads would be closed to all wheeled vehicle traffic. The full length of NFSR 794.2B1 and NFSR 794.2D, and a portion of NFSR 794.2H would be closed. The proposal would also decommission an

unneeded 0.3-mile section of NFSR 794.2H. This section of road is currently located behind a closed gate and considered in storage.

The potential exists for road closures to fail. The impacts of failures would be greater for temporary roads because these roads represent increases of road density, possible soil erosion and/or compaction and long term disruption to wildlife in areas where these impacts have not existed before. Road closure failures on existing roads could have erosion problems because maintenance will no longer occur. Wildlife disruption and soil compaction problems would not have an impact beyond current conditions for closure failures on existing roads because these impacts would not be different from the no-action alternative if they were to occur. However, the goals of this project would not be fully accomplished. Based on past experience in the area, and on site evaluations, we do not anticipate that road closures will fail for either temporary roads or existing roads, and U.S. Forest Service personnel will monitor these closures and take corrective action when necessary.

Under this alternative vegetative management would occur within the project area. The proposed haul route would be along NFSR 794. There would be an increase in traffic along this route as a result of harvesting activities. This increase would be relatively minor. An increased need for road maintenance and safety signing would be an effect of conducting this proposed action. Standard language in the timber sale contract would provide for safety considerations, such as safety signing, pertaining to NFSR 794. Road maintenance provisions in the contract would also provide a maintenance schedule to assure that the road is kept in good condition during harvesting activities. Road reconstruction, closure (place into storage) and decommissioning would all serve to reduce resource damage from the existing situation and improve drainage, alignment, and apply spot surface material where needed on roads that would be used for product removal. Refer to **Map 6** in the Appendix A for a display of the desired future transportation system with these alternatives.

Table 30. Summary of Proposed Road Actions

Action	Alternative			
	2		3	
	Road Number	Approx. Miles	Road Number	Approx. Miles
TEMPORARY ROAD CONSTRUCTION				
	Unit 5	0.45		
	Unit 6	0.20	Unit 6	0.20
	Unit 7	0.10	Unit 7	0.10
	Unit 9	0.10	Unit 9	0.10
	Unit 9A	0.10	Unit 9A	0.10
	Unit 12	0.10	Unit 12	0.10
	Unit 13	0.10	Unit 13	0.10
	Unit 13A	0.10	Unit 13A	0.10
Total				
Obliterate (level 6*) after use	All Temp Roads	1.25		0.80
RECONSTRUCTION - the following roads require *spot* reconstruction				
	794.0	1.5	794.0	1.5
	794.2B	1.7	794.2B	1.7
	794.2B1	1.3	794.2B1	1.3
	794.2C	0.5	794.2C	0.5
	794.2D	1.0	794.2D	1.0
	794.2H	0.6	794.2H	0.6
Total		6.6		6.6
OBLITERATE AND DECOMMISSION				
close level 5*	794.2B1	1.3	794.2B1	1.3
close level 5 (0.9), and obliterate level 8 (0.3)	794.2H	1.2	794.2H	1.2
close level 5	794.2D	1.0	794.2D	1.0
Total		3.5		3.5

* Road closure Level is defined in the EMS operational controls for road decommissioning (EMS-4.4.6-001-NO)

Cumulative Effects

Alternative 1 – No Action

Roads analysis for this project is documented in the Perfecto Creek Timber Sale project file. During analysis for the Perfecto Creek Timber Sale the district evaluated the transportation system specifically within the project area including past, current and foreseeable future management needs. Under this alternative, management of the transportation system within the project area would continue under existing policies. Cumulatively the effect of taking no action would not change the access provided in the area, however, the opportunity to make long-term improvements where resource damage has been identified on roads in the project area would be lost.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement

The road related activities are the same for Alternative 2 and 3, with the exception of the temporary roads needed, so they are combined in this discussion. Implementation of these alternatives would reduce the open road density within the project area. Resource damage that is occurring from NFSR 794.0 would be alleviated by improving vegetative ground cover and building hillslope and channel sediment retention structures. Reconstruction on portions of NFSR 794.0 .2B, .2B1, .2C and .2D would improve drainage, reduce sedimentation and improve the overall safety over existing conditions on those roads. There will be more temporary road construction under alternative 2 as compared to alternative 3, 1.25 and 0.8 respectively. All temporary roads will be decommissioned after use, so they will not have a significant sustained impact on the transportation system. Overall, the road related impacts associated with Alternatives 2 and 3 would be minor and short lived. The cumulative impact would be positive, with decreased road densities and reduced road related erosion.

Economics

Affected Environment

The purpose of economic analysis is to evaluate each proposed alternative using discounted cash flow rate of return analysis. The analysis tool used for this process is the USDA Forest Service financial analysis software package (Quicksilver v. 5.004.45). For each alternative the financial measures of Present Net Value, Benefit-Cost-Ratio, Net Annual Equivalent, Composite Rate of Return, and Internal Rate of Return are considered.

The first step in the evaluation process is to identify relevant cost activities for each given alternative and determine their timing and units of measurement for both accuracy in the discounting process and proper equivalency. The next step in the process is to determine the relevant benefits of each management alternative. Total yearly benefits and costs are summed up based on the units of measure and the inputs, outputs, and timing of logging activities as proposed.

Guided by the scope of this analysis, benefits and costs directly related to the management activities are considered for each mutually exclusive alternative. In this report benefits and costs are compared between Alternatives 2 and 3.

Cost and benefit estimations are derived from averages taken from recent timber sales on the GMUG NF. All benefits and costs are measured in terms of real dollar values to reflect constant purchasing power. Cumulative effects and requirements are derived from the specific management alternative. Benefits are accumulated based on the estimated stumpage yields of each proposed management alternative.

Some inputs to the analysis are assumed for simplicity. The discount rate used in the project is 4%. The timing of all benefit and cost activities is consecutive or bi-yearly, thus derived from the desired start year of the project. Inflation is assumed to equal cost escalation over the analysis period.

Environmental Consequences

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement

As mentioned above, an economic analysis was completed for this project proposal using standard discounting procedures of costs and benefits. The "Economic Returns Report", produced by Quicksilver, is located in the project file at the Gunnison Ranger District office.

Economic benefits and costs are compared between Alternatives 2 and 3. Alternative 1, the No Action Alternative, is not included in the comparison, as all costs and revenues are zero. Costs included in these alternatives are: noxious weed control, road closures, road decommissioning, road reconstruction, contract administration, site preparation,

regeneration surveys, and sale preparation. Costs were derived using averages from recent timber sales on the Grand Mesa, Uncompahgre, and Gunnison National Forest. Benefits are financial gains based on current expected timber prices (appraised stumpage rate). This analysis determines only direct financial costs and revenues; however, there are many other types of benefits to the land and communities that would result from these proposals.

The costs included in Alternatives 2 and 3 are essentially the same, with alternative 3 having lower costs for the timber volume dependent activities of harvest administration, sale preparation, site preparation, and regeneration surveys. All other costs are equal. Revenues are projected to be less for Alternative 3 due to the reduced timber volume proposed for harvest. The following table displays the results of our economic analysis.

Table 31. Perfecto Timber Sale Economic Calculations (Quicksilver v5.004.45)

Economic Measure	**Alternative 2**	**Alternative 3**
Benefit Cost Ratio	1.71	1.67
Composite Rate of Return	10.36 %	10.07 %
Internal Rate of Return	44.10 %	42.29 %
Investment Length	9 years	9 years
Present Net Value	$239,795.38	$183,969.92
Present Value Benefits	$579,086.62	$460,209.73
Present Value Costs	-$339,291.24	-$276,239.81

Based purely on direct market values, both Alternatives 2 and 3 have positive present net value and benefit cost ratios greater than 1.0 at the appraised stumpage rate. Alternative 2 has a greater positive present value and a higher benefit/cost ratio. The largest costs associated with these proposals are the sale preparation costs and a considerable amount of road reconstruction and closure costs.

It is important to note that these estimates are based on an appraised stumpage value, and it is not uncommon for timber sales to be purchased at rates above the appraised value. Due to this consideration, it is possible that either alternative could result in a higher return. In this case, there would be more money available to deposit into the Knudson-Vandenburg (KV) fund. Money from this fund goes directly back into the timber sale area to ensure adequate regeneration and for sale area improvement such as road closures, noxious weed control, riparian restoration, or range improvements.

Cumulative Effects

Some benefits from the environmental and social standpoint cannot be quantified. Closing or decommissioning the 3.2 miles of road will benefit wildlife, soil, and water resources. It will also lower the ongoing cost of road maintenance. Soil and water resources will benefit through the reduction of erosion and sedimentation. Increased forage production will result from the silvicultural treatment, providing benefit to cattle and wildlife. With wildlife habitat improvement for deer and elk, hunting opportunities may also improve in the Perfecto Creek area. This could lead to an increase in hunters in

the area, which would benefit communities through an increase in tourism dollars raised through the purchase of hunting licenses.

Timber harvest opportunities would benefit the local economy through providing local mills with raw wood fiber. Wood products could then be returned to the community as dimensional lumber, firewood, biomass, post and poles and/or house logs. The ongoing building activity in the Gunnison area (and Colorado in general) has led to a high demand for wood products. Additionally, the silvicultural treatments will result in higher wood fiber yields over the long term by regenerating faster growing, healthy trees at desirable stocking levels.

Conversely, there are costs associated with these proposals that are also not easily quantified. There is a risk of soil loss or compaction caused by harvesting operations performed using poor practices or at times of high soil moisture. These costs can be avoided by using proper harvesting practices and enforcing operating restrictions and following the project design criteria. It is our intention to require the use of these practices. There may also be temporary costs associated with a reduced aesthetic quality in recently disturbed harvesting sites and skid trails. These costs are subjective and depend upon the perspective of the viewer. As time passes, the disturbed sites will respond to the treatments, causing young trees to regenerate and the evidence of harvesting disturbance will fade.

Additionally, the timing of both benefit and cost activities is subject to some sensitivity, which is not considered in this economic analysis. The present value of future revenues and costs is based on their timing, and there is not 100% certainty that the management activities proposed under any alternative would occur in the years noted in the analysis. If management activities occur sooner than planned, the present value of each alternative would increase. The opposite is true if proposed activities occur later than planned. The timing of the benefit and cost activities does not however, affect the amount of recognized cash flows of the activity as it occurs.

Air Resources

Affected Environment

The analysis area is within the Gunnison Airshed. This area incompasses the entire upper Gunnsion Basin watershed and ends along a western boundary from the eastern rim of the Grand Mesa, south through Paonia Colorado, crossing the Gunnison River just above the Black Canyon National Park and ending at the hydrologic boundary between the Gunnison and Animas basins. The La Garita Wilderness which forms a boundary along the western extent of the proposed project area is a Class I airshed. This designation under the Clean Air Act calls for the highest level of protections designed to protect sensitive air quality receptors. Regional haze is an emerging issue for Class I areas located in the southwestern quadrant of the State. The primary source of haze is thought to be emissions from 4-corners coal-fired power plants and rapidly expanding gas development in the San Juan Basin. Prevailing weather patterns and topographic influences will tend to move emissions from the project area downvalley and away from the Class I area. There are no communities that could potentially be affected by emissions. There are scattered residences down wind from activities.

The proposed action will include activities that may potentially increase particulate emissions. Impacts to human health and visibility are the potential effects generated by particulate emissions. Forest activities which can contribute to particulate emissions include burning of logging residue and dust from roads.

Environmental Consequences

Alternative 1 – No Action
There would be no effects to air resources.

Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
The consequences of proposed activites to air resources and human health are expected to be very similar to both alternatives 2 and 3. Woody debris (YUM, tops & limbs) will be piled and burned on the landings. The impacts associated with burning would be limited to just a few days over the life of the sale. Piles tend to burn hot, as piles are clean and well oxygenated. This achieves more complete material consumption and less smoke. Burning would be done under the terms and conditions of a State issued burning permit. These plans will prescribe the necessary atmospheric and weather conditions to promote good smoke dispersal. Burning will only occur when required conditions are forecast. Typically burning would be limited to periods of the year when use of the Wilderness Area is very low. Smoke that is generated will tend to move away from the Class I area and towards the northeast. Treatments are all considered to be light or moderate. With current utilization standards and requirements for nutrient recycling, by leaving material on site, there is not expected to be significant quantities of material that require burning.

Road use will generate fugitive dust, however, these are temporary effects and would likely be cumulatively insignificant. It is difficult to project the amount of logging traffic that will be using the roads and under what conditions. However, current experience suggests that on average we could expect only 6 to 8 truck loads a day to come off a sale like the one being proposed. If this use occurs during a dry period then dust will be created, but since we are projecting just a few trucks per day and these roads get little other use the impacts will be insignificant. Dust from roads is not only an air quality concern, but can be a safety issue and road a surface protection issue. If road dust gets to be a significant problem some dust abatement measures may be required.

Cumulative Effects

Alternative 1 – No Action
Alternative 2 – Proposed Action &
Alternative 3 – Old Growth Retention and Aspen Stand Improvement
Implementation of the Proposed Action would not increase cumulative effects to air resources above the existing baseline identified in the Affected Environment.

Chapter 4 - CONSULTATION AND COORDINATION

Agencies, Organizations, and Individuals Contacted

Listed below are those agencies, organizations, and individuals who were contacted through scoping or through consultation.

Federal Agencies

U.S. Fish and Wildlife Service, Grand Junction, CO

State Agencies

Colorado Division of Wildlife, Gunnison, CO
Colorado State Forest Service, Gunnison, CO

Local Government

Saguache County Commissioners, Saguache, CO

Elected Officials

Representative John Salazar, Grand Junction, CO
U.S. Senator Ben Ken Salazar, Denver, CO

American Indian Tribes

Business Committee Ute Indian Tribe, Fort Duchesne, UT

Businesses and Organizations

Intermountain Forest Industry Association, Rapid City, SD
Delta Timber, Delta, CO
Intermountain Forest Products Inc., Montrose, CO
Ancient Forest Rescue, San Luis, CO
Forest Guardians, Sante Fe, NM
Colorado Wild, Durango, CO
Colorado Timber Industry Association, Montrose, CO
Crested Butte Forest Rescue, Crested Butte, CO
CU Wilderness Study Group, Boulder, CO
High Country Citizens' Alliance, Crested Butte, CO
Forest Conservation Council, Santa Fe, NM
Mountain Valley Lumber, Saguache, CO

Individuals

Roy Duncan, Monte Vista, CO
Dave Mapes, Gunnison, CO
Rebie Sue Collins, Gunnison, CO
Shane Cox, Gunnison, CO
Christi & Gary Hill, Saguache, CO
John Judson, Gunnison, CO

Distribution and Review of this EA

A legal notice is being published in the Gunnison Country Times, stating that this EA is available for public review and comment. Copies of the EA are being mailed to persons, groups, and agencies that have expressed interest in this project.

List of Preparers

The following Forest Service employees comprise the ID Team that conducted the environmental analysis and prepared this EA.

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APPENDIX A

Map 1 – Vicinity Map, Perfecto Creek Timber Sale

Map 2 – Alternative 2 - Proposed Action, Perfecto Creek Timber Sale

Map 3 – Alternative 3 - Old Growth Retention and Aspen Stand Improvement, Perfecto Creek Timber Sale

Map 4 – Existing Road System

Map 5 - Riparian Areas and Wetlands

Map 6 - The Desired Future Transportation System

Map 7 – Canada Lynx Habitat