DOLORES PUBLIC LANDS OFFICE

ENVIRONMENTAL ASSESSMENT
Aspen Forest Health and Restoration Project

Responsible Official:
STEVEN K. BEVERLIN
Manager, Dolores Public Lands Office

For information contact:
MARK KRABATH
Supervisory Forester

Dolores Public Lands Office
29211 Highway 184
Dolores, CO 81323
(970) 882-7296

Montezuma County

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Chapter 1 – Purpose and Need

The Dolores Public Lands Office has prepared this Environmental Assessment (EA) on the potential environmental effects of proposed activities in the Aspen Forest Health and Restoration Project area, in compliance with the National Environmental Policy Act (NEPA) and the Healthy Forests Restoration Act (HFRA) and other relevant federal and state laws and regulations. Additional documentation including more detailed analysis of project-area resources, may be found in the project planning record located at the Dolores Public Lands Office in Dolores, Colorado and available for review upon request.

1.1 Background

Quaking aspen thrives on disturbance to reset the stand and keep it vibrant and healthy. Aspen forests traditionally develop after stand-replacing disturbance such as fire or wind-throw. The root systems of aspens usually survive fires, sending up thousands of new stems (suckers) to regenerate the forest. In some cases conifers establish as seedlings, but faster growth of aspen suckers allows aspen to dominate the forest for decades. Not all aspen forests have conifer seedlings and these areas may remain dominated by aspen for more than a century. Most of the mature aspen forests covering the analysis area likely resulted from large, intense, historical fires. This area is also managed forest and patches of young aspen forest occur where past coppice-cut treatments took place.

Within the analysis area, approximately 20,726 acres of National Forest land are typed as aspen (51% or more aspen). Some have a component of conifers to varying degrees while others contain primarily aspen trees.

Drought in past years, coupled with a variety of secondary insect and disease agents has caused mature aspen trees to die at a faster rate than normally occurs. The epidemic is labeled Sudden Aspen Decline (SAD), and aerial detection surveys found approximately 11,673 acres or 36% of the analysis area affected. After consulting with forest insect and disease specialists, the San Juan Forest Supervisor, Mark Stiles, determined that an insect and disease epidemic is occurring[1].

Initial research efforts on SAD are showing reduced health and vigor of root systems to the point that suckering is greatly diminished. Observations show a traditional suckering response of thousands of sprouts per acre after a disturbance is not occurring when trees die from SAD agents[2]. This has caused concern for the future of aspen in some of these areas. Weaker sprouting may result in sparse or patchy aspen in the future if SAD is allowed to run its course.

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[1] Reference *Sudden Aspen Decline, Epidemic Determination; Mancos Dolores Ranger District, San Juan National Forest* 6/30/08 and *Determination of Sudden Aspen Decline Epidemic in the Aspen Forest Health and Restoration Area* 10/9/08

[2] Reference *Status Report of Plot Study of Sudden Aspen Decline in Southwestern Colorado.*

For this analysis area, the die-off of aspen is occurring in lower elevation, and/or southwest facing slopes and/or dry sites. Aspen 5-14 inches Dbh (diameter at breast height) or greater are affected and, for the most part, stands of early seral sprouts, saplings, or poles less than 5 inches Dbh are healthy. Past regeneration harvests have occurred over the past 30 years on approximately 3,500 acres in the analysis area. The interspaces between past harvests are showing SAD characteristics, but the past regenerated stands are relatively healthy and range in size from sprouts to poles. Many areas with signs of SAD are not entirely dead, but contain a combination of green trees, trees with fading crowns, and scattered dead trees. Trees currently infested by wood borers and fungal diseases and/or aspen bark beetles are declining and substantial amounts of aspen mortality can be expected in areas currently showing evidence of decline. In areas impacted by SAD, the value of merchantable size trees is diminishing as trees die and become too rotten for use (1-3 years after tree death). The use of commercial timber harvest as a tool to regenerate aspen stands would no longer be available once trees become un-merchantable.

The many values of aspen specific to this analysis area, and the existing situation where those values are diminishing as a result of SAD, are described in more detail in the *Values and Existing Conditions* document in the project file. They are summarized briefly in the table below.

Ecosystem and Resource Values Undergoing Changes from SAD

Value	Change
Scenery and Recreation	Fewer aspen patches in conifer areas reduces visual diversity. Fewer aspen inclusions or stringers reduce the diversity of fall color in pine/oak areas (ex: lower slopes of Caviness). A drop in tree size (change in forest structure) may appear visually degraded to visitors. In aspen areas, where regeneration occurs young green trees would add to scenery and mask the SAD decline.
Fire Risk	Fewer aspen stands or aspen stringers in the ponderosa pine zone can increase potential fire spread and increase resistance to control. This is due to the fact that fire generally exhibits minimal spread and intensity in aspen stands under most environmental conditions. Some aspen stands are converting to shrublands and timberlands with a high loading of dead aspen stems in the short term. Potential fire behavior in shrublands, with dead aspen fuels present, could have greater intensity than aspen stands. This is due to increased dead fuel load and drier fuels as a result of the lack of green aspen canopy to maintain shade and shelter from the wind all summer.
Forest Floor plants (forage)	Kentucky blue grass, or native bunchgrasses and snowberry are likely to be the main species that dominate the herbaceous and shrub understory regardless of changes in mostly pure aspen overstories. Drier conditions may reduce sedges. Where conifer understories are well established, the understory has already changed in response to the conifer layer. Amount of grasses and snowberry may increase in openings where aspen does not regenerate. Although there are no examples currently, some of the aspen/snowberry on harsh sites may trend towards snowberry fields with grass intermixed.
Wood Product	Areas with pine or warm-dry mixed conifer are shifting to conifer product opportunities. Aspen is not usually offered for timber harvest in the pine/oak mix areas there is not a major change. The greatest change occurring is the lack

Value	Change
	of wood opportunity in aspen 9 inches and greater until such time as the pole size stands is the area grow to that size in 50 or so years. Local post, pole and firewood opportunities may be diminishing in some areas.
Wildlife – goshawk	In short term, SAD stands with existing goshawk nests (2 stands) may not be available for nesting. If stand regenerate they will provide nesting opportunities in 50-75 years.
Wildlife - birds	Changes from SAD that result in aspen cover type may diminish bird diversity, especially where aspen becomes reduced as a component of aspen/conifer forests. Openings created from sparse regeneration in SAD stands might increase habitat for grass/shrub dwellers.
Wildlife – snowshoe hare	Where warm/dry and moist mixed conifer stands lose aspen inclusions, or aspen overstories, snowshoe hare habitat may diminish.
Wildlife – cavity nesting	Because aspens rot and fall over quickly after dying, aspen stands that are dead are providing nesting habitat for a shorter period of time than mature stands. Cavity nesting habitat is not be replaced until the sapling/pole stands in the nearby past cut areas grow to larger sizes (approx. 50 years). Where aspen inclusions do not regenerate, future aspen cavity habitat is diminished.
Wildlife – small mammals	Down woody material for small mammal habitat is increased in the short term as aspen trees die and fall over. If aspen regenerates, trees won't grow to sizes that can produce large logs for some time. Where conifer replaces aspen, woody material remains available.
Riparian	Since most of the perennial rivers and streams are located on mesic sites with lower levels of SAD, and also contain a variety of species providing shade, few changes are expected for perennial streams/rivers. Some ponds and wetlands however, are surrounded by dead or dying aspen which could change shading and temperatures. Erosion potential could increase for ponds/wetlands surrounded by Kentucky bluegrass, depending on the success of aspen sprouts. Many of the intermittent streams are rock lined, which lessens erosion concern even if the aspen overstory dies off.
Watershed	Areas that convert to a shrub and/or grass/forb community with no conifer component may experience a decrease in evapotranspiration rates, but because shrubs, grasses and forbs have shallower rooting depths, there would also be less recharge to soil profiles and a reduction in contribution to stream flow. The openness of a shrub/grass/forb community could reduce snowpacks due to more surface area exposure, allowing an increase in wind scour and an increase in evaporative losses. Conversion to predominantly conifers would increase evapotranspiration rates, which means there would be less water available to produce understory vegetation, recharge soil profiles or contribute to stream flow. If conifers replaced aspen along riparian areas, water temperatures could increase because conifers provide less shade to riparian areas than aspen. Conifers intercept more snow than aspen, but once snow is on the ground, evaporative losses are reduced. Since there are so many other factors affecting water discharge, a marked change in this area is not expected.
Biodiversity/	Lower elevation landscapes are trending towards more homogeneity. This in

Value	Change
Succession	turn affects plant and animal diversity, as species that depend on aspen stringers lose habitat. On the other hand, Douglas-Fir and Blue spruce are currently under-represented on the District, so changes from aspen to these forest types may be beneficial. Warmer temperatures, less precipitation and longer growing seasons may favor these conifers. Fire is a missing component. Aspen on the district is weighted towards a mature age and size structure due to the lack of stand replacing fires. With the advent of SAD as a disturbance factor, many of these mature stands may get set back to an early seral state, providing adequate regeneration takes place.

There are a number of current San Juan Forest Plan goals and objectives (desired conditions) in the areas of vegetation, wildlife, timber, community development, and protection that apply to the analysis area. They include but are not limited to the following,

- Improve the health and vigor of all vegetation types. (Page III-3)
- Integrate vegetation management with resource management in all functional areas--recreation, wildlife, range, timber, and water. (Page III-3)
- Improve the Forest-wide age class and species diversity to improve forest health and wildlife habitat. (Page III-4)
- Implement an integrated pest management program emphasizing silvicultural management of timber stands to prevent and control insect infestations and disease. (Page III-4, III-5)
- Perpetuate the aspen type. (Page III-4)
- Provide the opportunity for economic growth of industries and communities dependent upon Forest outputs. (Page III-5) Provide for community stability. (Page III-5) Provide timber sale offerings that address the needs of the local dependent industry. (Page IIIa-1)

There is a gap between the current situation of rapidly declining aspen stands and the desired conditions described in the goal statements listed above. This gap represents a need for action. The *Vegetation Report* in the project file describes the field inventory and evaluation process that located stands where actions are needed and feasible.

Places where there was not a need for action at this time include areas of dead scattered overstory trees with healthy pole or sapling size understories from previous management, and areas with very light levels of SAD. Areas where a need for action exists, but mortality was so extensive that the root system may be too degraded to ensure regeneration were not considered for potential treatments. In addition, some SAD areas occurred on steep slopes or inaccessible locations, and some areas had 20-50%+ conifer, and it is difficult to sell or remove this much conifer with an aspen timber sale.

Future planning is needed to address other aspects of aspen management. Many of the mature and over-mature aspen areas include upwards of 50% conifer. Remnant old aspen in other conifer stands suggest that aspen root systems are still available, should disturbance occur. Conifer succession lessens the overall amount of aspen on this landscape, as it always has under

normal successional processes. Prescribed fire, Wildland Fire Use, and conifer timber sales are options to consider in the future for reversing conifer succession and maintaining aspen. However, there is a need to immediately focus on areas of heaviest insect and disease damage where conifer presence is less of a factor. This analysis does not cover the topic of conifer succession in healthier aspen/conifer mix areas.

1.2 Purpose and Need

Four needs for action have been identified based upon inventory and evaluation of the analysis area and Forest Plan goals. The overall purpose of the proposed action is to prevent the loss or further degradation of aspen forests in areas heavily impacted by Sudden Aspen Decline (SAD).

Forest Health and Structure: There is a need for increased acres of young (seedling/sprout stage) aspen in areas experiencing SAD in order to prevent the loss of aspen forest to insect and disease agents. Aspen is a short lived species (80-140 yrs) on average. The majority of aspen on the forest is in a mature or over mature age class. As aspen trees age beyond 80 years, incidence and extent of decay fungus and disease rapidly increases. Maintaining age class, size class and species diversity is vital to ecosystem stability. Inventory of SAD affected aspen stands in the project area indicate a wide range of mortality in the over-story. Research indicates a strong correlation with crown fade and root mortality[3]. With SAD agents, research indicates that if aspen roots die, the clone may not regenerate itself, or would do so in a patchy, sparse manner that does not result in a fully stocked aspen stand. In some stands, the amount of dead trees suggests the root systems may be too deteriorated to regenerate. In others however, there is a mix of dead and live healthy crowns, or live fading crowns that suggest prompt action could result in adequate suckering and maintain aspen on the site. Younger stands in the analysis area (sapling and pole size) are resilient and show limited signs of insect and disease agents.

Local economy: There is a need to support the local economy and its dependence on timber, grazing and recreation in the aspen forests. Aspen in the analysis area is located within lands accessible by road and within the suitable base for timber production. The areas have in the past, and continue to provide, wood products for the local region, contributing to local economies. Two mills in Montezuma County currently utilize aspen, and depend on a stable supply of timber from the San Juan NF. Commercial timber harvest has, and continues to be, a tool that can be used to achieve resource management goals. There is a need to capture the value of dead/dying trees where environmentally and economically feasible. In areas impacted by SAD, the value of merchantable size trees is diminishing as trees die and become too rotten for use (1-3 years after tree death). Other economic values of aspen include under-story forage for livestock and wildlife, and scenic beauty which draws outdoor recreation enthusiasts to local communities and provides business opportunities for outfitter guides.

Fuel Reduction and Fire Resiliency: It is recognized that fire is a disturbance agent capable of creating new aspen stands. However, there is a need to maintain healthy green aspen forests as a green belt to limit the size and intensity of large wildfires adjacent to private land/homes and recreational development. Wildfires that burn under extreme conditions can affect soil and water

[3] Status Report on Plot Study of Sudden Aspen Decline in Southwestern Colorado, Worall, December 2008.

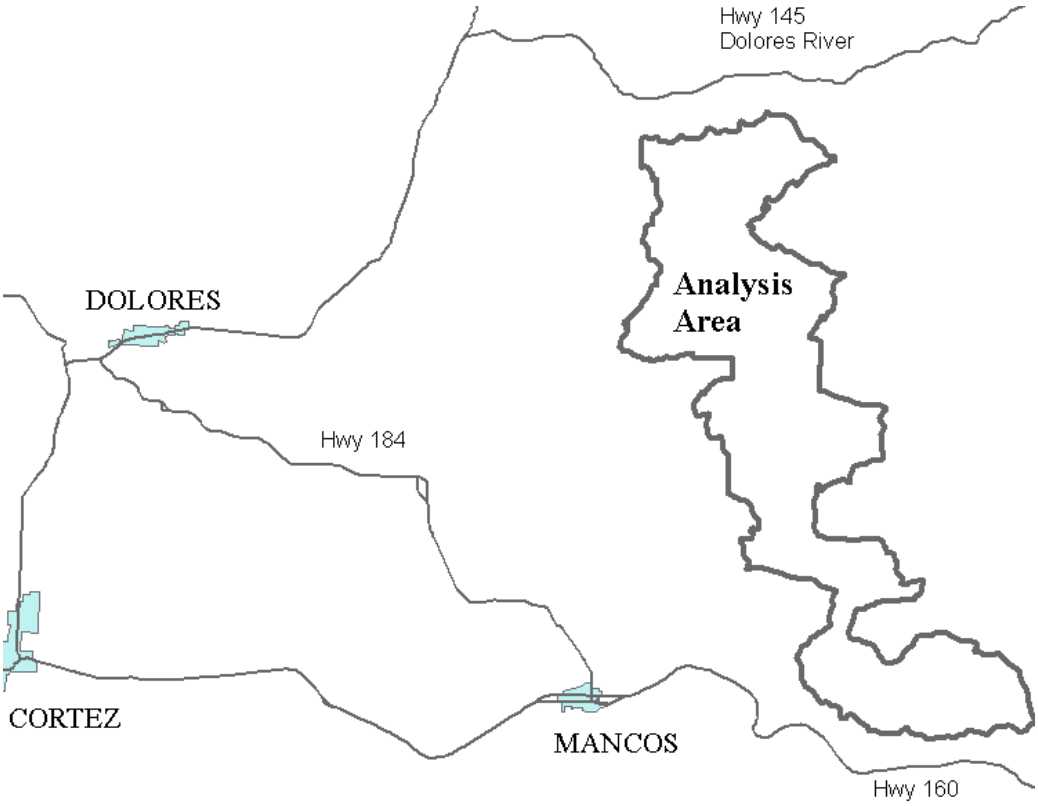
quality as well as other resources. As a result of SAD, dead/down woody material and standing dead trees in lower elevation aspen areas contribute to increased fuel loads, which result in more intense wildfires under extreme burning conditions. This is undesirable in proximity to recreation developments and private land.

Historical Disturbance Patterns: There is an opportunity to mimic large and contiguous historical disturbance patterns across the landscape. Past regeneration harvests created small patches of early seral sprouts, saplings and poles in areas ranging from 10-30 acres. This has created a 'swiss cheese' effect with the past regeneration looking like holes in a matrix of mature aspen forest. Research suggests that historical disturbances such as wildfire would have not created such small patch sizes as exist from past regeneration harvest. There is a need to 'connect up' past regeneration with new patches to maintain a larger contiguous patch of early seral aspen forest. The contiguous early-mid seral patches would have a variety of tree sizes and ages because of the variety of past treatment years. In addition, the role of fire on the landscape has been limited in the past and there is an opportunity to re-establish fire's role in the ecosystem through larger prescribed burns.

1.3 Analysis Area Location

The Aspen Forest Health and Restoration project area lies within the broader area of Caviness Mtn, Echo Basin, Transfer campground and Haycamp Mesa area. This analysis area is defined by Hwy 160 on the south moving northwest across the District to Hwy 145 and the Dolores River on the northern end (see map). There are an estimated 32,000 National Forest acres with approximately 20,726 acres of aspen cover type (forested areas with 51% or > aspen). The analysis area is located within Montezuma county in all or portions of T38NR13W Sections 13-15, 22-27, 34-36 and T38NR12W Sections 7,8, 16-20,30-33 and T37NR13W Sections 1-3, 10-13, 24,25 and T37NR12W Sections 4-9, 16-22,27-33 and T36NR12W Sections 3-11, 15, 16, 21-28, 34-36 and T36NR11W Sections 19, 20, 29, 30-32

There are no Wilderness Areas, Research Natural Areas, Wild and Scenic Rivers or other specially designated areas within or affected by this project.



1.4 Proposed Action

Aspen is a unique species in that it will regenerate itself from root suckering following a disturbance (harvest, fire). Silvicultural practices are commonly used to alter forest conditions, and treatments can be implemented to favor specific species such as early successional aspen. They can be used to increase the health and vigor of the tree component by controlling stocking levels, or converting stands to younger age classes.

In consultation and collaboration with interested parties, a set of proposals was developed to take steps to improve aspen forest health. Proposed Actions include approximately 1,550 acres of coppice clearcut harvest with reserve clumps, 70 acres of mastication with burning, 1,500 acres of prescribed burn only, 12 miles of handfelling dead or dying trees from roadsides, and 1-15 acres of root ripping adjacent to but outside of natural wetlands. The proposed actions include project design features for soil and water protection, cultural site protection, threatened, or sensitive species protection, visual quality, and others. The proposed actions also include monitoring. A detailed description of the proposed actions made available to the public during scoping can be found in the *Scoping Package* located in the project file. These detailed proposals were later refined into Alternative B as described in Chapter 2 of this EA.

The proposed action is consistent with the 1982 San Juan Forest Plan (as amended).

1.5 Decision Framework

The decision to be made is whether to conduct actions as proposed, in a modified or alternative manner or to take no-action at this time. The deciding official is Steve Beverlin, Manager, Dolores Public Lands. This project was developed under the Healthy Forest Restoration Act of 2003, and specifically Title 1, Section 102, Paragraph 4 which defines authorized projects as

> "Federal land on which windthrow or blowdown, ice, storm damage, the existence of an epidemic of disease or insects, or the presence of such an epidemic on immediately adjacent land and the imminent risk it will spread, poses a significant threat to an ecosystem component, or forest or rangeland resource, on the Federal land or adjacent non-Federal land."

This act contains a variety of provisions to expedite projects that address threats to forest and rangeland health from insect infestations and tree diseases. The Act also requires collaboration in the development of proposals.

1.6 Results of Scoping

Various individuals and organization representatives provided input to this project either during collaboration prior to development of the proposed actions or during scoping. Comments were considered by the interdisciplinary team and decision-maker (IDT meeting notes). There were no major issues identified and therefore no additional alternatives were developed. Chapter 4 describes public participation in this planning effort in more detail. Some comments led to refinements in monitoring and project design.

The following refinements were made to the proposed action to create Alternative B.

- One stand was dropped from harvest to provide for goshawk nesting habitat.
- A detailed monitoring plan was developed and included in the alternative.
- Refined estimates for the location, segment lengths, and miles of temporary roads were added.
- Project design features and mitigation measures were developed and added to the alternative (see Appendix B).

Chapter 2 – Alternatives

This chapter describes the alternatives of Alternative A (No Action) and Alternative B (Proposed Action). Additional detail is located in Appendix A (Maps), Appendix B (Design Features) and Appendix C (Monitoring).

The action alternative takes steps to move towards the desired conditions described by goals and objectives in the Forest Plan, and outlined in the purpose and need section above, but do not achieve those conditions in a single entry.

2.1 Alternative A – No Action

Under the No-Action alternative, no management actions such as clear-cutting, prescribed burning, mastication or root ripping would occur at this time.

2.2 Alternative B – Proposed Action

The following describes the Proposed Action Alternative. Design features in Appendix B and the Monitoring Plan in Appendix C are also part of this alternative. After scoping, additional details were added to the monitoring and design features descriptions.

Coppice Clearcut Regeneration Treatment with reserves (~1,550 acres) – See Map in Appendix A. Harvest includes the following:

- All merchantable trees removed, and unmerchantable trees cut and left on site, except patches of aspen or conifer trees retained as reserve clumps on 10-15% of each unit. Patches of existing healthy regeneration retained.
- Objective is a new young stand of aspen, with scattered clumps of snags, conifer, or older trees.
- Unit openings range in size from 9 acres to 109 acres. Some proposed units share a partial boundary with units in the ongoing Turkey Knolls timber sale, and larger temporary openings may be created depending on the year harvested.
- Regeneration harvests would be accomplished with commercial timber sales administered by the Forest Service.
- Areas would be cut at different times over a 3-5 year period with the first timber sale offered in 2010.
- Follow-up prescribed burning may occur on any unit, however it is likely only a few units may be selected based on timing of harvest and burning conditions. Coordinate with range staff for post burn grazing schedule.
- Additional project design features are described in Appendix C as part of this alternative.

Landscape Prescribed Burn (~1,500 acres) – See Map in Appendix A. These are broadcast burns and include the following,

- Burning will take place when prescriptions detailed in the burn plan allow. This would most likely be in fall, after frost kills understory plants, and when future wet weather is imminent.

- Ignite by helicopter or hand crews
- Objective is a mosaic of grassy openings, stands of early seral aspen, widely scattered ponderosa pine, pockets of dense mixed conifer, and unburned pockets.
- Burns would be implemented by Forest Service or contract crews under direction of Forest staff.
- Burns are dependent on the right fuel moistures and weather conditions; therefore they may occur anytime over the next 10-15 years when the conditions are optimal. (see Design Features in Appendix B)
- Each area would be burned once.

Mastication with Prescribed Burn (~70 acres) – see map in Appendix A. Mastication includes the following,

- Dead and dying aspen up to 10 inches DBH, and approximately 50% of Gambel oak less than 6 inches DRC would be chipped with mastication equipment. When oak is cut, the ladder fuels under ponderosa pine canopy would be targeted.
- Immediately following mastication, and before next growing season, unit should be burned.
- Desired effects from treatment are a mix of aspen sprouts, clumps of mature oak, native bunch grasses, and existing ponderosa pine with oak ladder fuels reduced.
- Mastication would be accomplished by equipment contractors administered by the Forest Service
- Implementation is expected to occur sometime between 2011 and 2015.
- Areas proposed for coppice clearcut immediately adjacent to the mastication unit may also be masticated and burned if they are not commercially viable as a timber sale. Other options for these units may be hand falling and firewood.

Roadside clearing – (~12 miles of road) –Along portions FR316 (Caviness Mtn), FR561 (W.Mancos Rd), FR385 (Chicken Creek Rd), FR559 (Millwood Rd), FR386, FR327, FR560 and FR556 (Haycamp Mesa Rd) as needed,

- Handfell dead and dying aspen trees to prevent them from falling into the roadway.
- Sections of road with heavy traffic would be accomplished through Forest Service crews.
- Other sections accomplished through commercial or noncommercial permits to cutters who would hand-fell and remove the wood.
- Conduct felling anytime between 2010 and 2015.

Root ripping adjacent to natural ponds, meadows or wetlands (1-3 acres)

- Root rip around parent aspen trees to stimulate suckering.
- Locations to be identified based on field review and recommendations from the Dolores Public Lands Office hydrologist.
- Accomplish anytime from 2010 thru 2015.

Sale Area Improvements - The following actions will be listed in the sale area improvement plan (in order of funding priority). These items qualify for Knutsen Vandenberg (KV) funds that

are collected from timber sale receipts. Essential KV tasks are associated with reforestation and would be funded prior to nonessential KV tasks

Essential KV tasks.

- Regeneration Monitoring - Surveys to monitor the success of aspen regeneration developed vegetatively from sprouts would be planned in all cutting units. These surveys are conducted the 1st year, 3rd year and 5th year after harvest. Effects of browse on aspen regeneration would be monitored on stocking surveys and problem units would be identified. This is an Essential KV item for cut units.
- Tree Planting- A need for artificial regeneration action is not anticipated at this time , but if regeneration surveys indicate a failure, and successful regeneration is not established at the minimum of 300 trees/ac, tree planting may be prescribed. Ponderosa pine would be planted at lower elevations, Douglas fir at mid elevation and englemann spruce at higher elevation.

Non-Essential KV

- Noxious Weed Treatment – Conduct inventory and treatment of noxious weeds as needed within the sale area boundary. Treatments may occur multiple times and anytime within five years after close of the sale.
- Exclosures- After coppice clearcut, if browsing pressure is high install wildlife/livestock exclosures to monitor browsing pressure.
- Hinge-Cut In areas that are receiving high browse pressure a hinge-cut method of falling trees along the boundaries of units to create a fence and barrier to ungulates may be used with force account or contract crews.
- Root Ripping- In areas that are in need of a stimulus to promote aspen suckering and occur along meadows a small cat with raker teeth would rip aspen roots to promote suckering. This would be tried on small areas as a pilot project with consultation from the District hydrologist.
- Watershed Improvement in the Upper Reaches of Box Canyon Creek – Within the sale area boundary, but outside of cut units, the following work would be accomplished based on hydrologist's field review. Reduce the tread width of newly identified motorcycle trail route from the size of old roadbed to a single track trail and improve drainage especially where the trail crosses the Box Canyon Creek. Re-contour or stabilize the upper reaches of the Box Canyon Creek that lies within the sale area, if needed.
- Un-needed roads identified in the Mancos/Cortez Travel Management Plan that fall within sale area boundaries may be decommissioned if funds are available. The transportation plan contains details about road decommissioning needs for each tentative sale area.

Design Features and Mitigation Measures - Applicable Forest Plan standards and guidelines, Best Management Practices, and Forest Service Manual and Handbook direction would be incorporated in project design and implementation. In addition, the proposed action alternative, Alternative B, includes all of the design features and mitigation measures listed in Appendix B.

Monitoring - Effectiveness monitoring for implementing the project as planned is achieved by timber sale administrators, service contracting officer's representatives, project field crew managers, and burn bosses who oversee projects. Appendix C contains a detailed monitoring plan that would be undertaken with Alternative B (Proposed Action alternative).

Adaptive Management – The proposed action, Alternative B, includes NEPA analysis for the following adaptations should they be required based on on-the-ground layout, research information or post harvest monitoring.

- If layout determines stands to have less than 30% live trees and/or there is concern for successful regeneration via coppice clearcut, then the units may be burned instead of harvested, or may be dropped from treatment. Root ripping might be attempted at a small scale within harvest units.
- If layout determines the units adjacent to the mastication unit are not merchantable, they may be included in the mastication project, or offered up for firewood.
-

2.3 Comparison of Alternatives

This section provides a summary comparison of the alternatives.

The following table compares the two alternatives for meeting the Purpose and Need, described in Chapter 1.

Purpose and Need	Alternative A (No Action)	Alternative B (Proposed Action)
Forest Health – resistance to insect/disease (early seral aspen)	Past and ongoing coppice clearcuts created a total of 4,218 acres or 20.1% of the aspen cover type in early seral stages more resistant to insects and disease. Future regeneration in SAD areas may be sparse or spotty resulting in open aspen overstory. Some areas (approx. 25%) may not maintain aspen.	Proposed coppice clearcuts increase the amount of aspen forest type in early seral stages to 5736 cares or 27.6% a 7.5% increase in aspen more resistant to insects and disease. Regeneration in treated areas is denser and more consistent. Future stands of closed aspen canopy are expected.
Local Economy	No contribution to local aspen industry from the Mancos/Dolores District in the near future.	Contributes aspen product for approximately 3 years, benefitting local aspen industry
Fuel Reduction near private lands	SAD mortality increases short term levels of dead/down material. Long term loss of aspen patches as 'greenbelts' where fire burns cooler under most circumstances.	Removes dead trees, thus reducing fuel loads. Promotes sprouting to maintain aspen 'greenbelts'.
Historical Disturbance Patterns – patch size	Patches from past coppice clearcuts remain less than 39 acres, and the interspaces between past cuts continue to decline from SAD with spotting regeneration expected in some places.	Coppice clearcuts are located in the interspaces between areas cut in the past, creating larger patches of contiguous aspen canopy in the future ranging from 60-400 acres.

Purpose and Need	Alternative A (No Action)	Alternative B (Proposed Action)
Historical Disturbance Patterns – fire in the ecosystem	No prescribed burns planned. Future Wildland Fire Use fires may occur, depending on conditions. Reduction in aspen 'greenbelt' patches makes Wildland Fire Use more difficult. Aspen stands on Rampart and Box Canyon areas continue to deteriorate. Regeneration expected to be spotty.	Two large prescribed burns re-introduce fire into the Rampart and Box Canyon areas and encourage aspen sprouting. Wildland Fire Use may occur in the future with more 'greenbelts' on the landscape because of aspen regeneration.

Chapter 3 – Environmental Consequences

This chapter briefly describes background or affected environment information and a summary of the direct, indirect and cumulative effects of each alternative. Conclusions described here are based on implementing the Alternatives as described in Chapter 2, including the design features and monitoring in Appendix B and C.

3.1 Forest Health and Vegetation (Harvest/Mastication Areas)

Conclusions below are summarized from the Vegetation Report located in the project file.

Background

Existing vegetation cover across the analysis area is summarized in the table below.

Acres by Cover Type

Cover Type	Acres	Percent of Analysis Area
Quaking Aspen	20,726	65%
Ponderosa Pine	1,705	5%
Spruce/Fir	1,508	5%
Douglas Fir/Blue Spruce	815	3%
Shrubs, sage/Gambel oak/snowberry	6,017	19%
Grass/Forbs	1170	3%
Others	111	0%
Total Acres	*31,907*	*100%*

Quaking aspen is the current prevailing cover type on over 65% of the area. The majority of these aspen acres exist as a pure or stable state with conifers occurring infrequently. At higher elevations, and at upper ends of Haycamp Mesa, Engelmann Spruce and sub-alpine fir are more frequent and are encroaching on aspen forests. Barring disturbance and over a very long period of time, these aspen areas would likely succeed to coniferous forests. At the lower elevations, Ponderosa pine and Gambel oak are becoming more frequent. Mountain shrub communities, mostly dominated by Gambel oak, and the small number of natural meadows are concentrated in lower elevations. This analysis area and this aspen cover type is in transition with the onset of SAD (see *Values and Existing Conditions* document in project file for further discussion on type conversion). Approximately 11,673 acres or a little over half the aspen cover type (20,726 ac) in

the project area has been identified as being affected by SAD from aerial detection flights conducted by the Gunnison Service Center 2005, '06 and '07. The other major cover type is the shrub layer which is predominately Gambel oak at lower elevations. This cover type is likely to expand if aspen does not regenerate at lower elevations in SAD stands. The aspen timber component covers an estimated 20,726 acres. Approximately two-thirds of this acreage is in a mature/overmature structure. Most of these stands are esentially pure aspen, and exibit high levels of mortality due to SAD (Sudden Aspen Decline) and the older age and size class distribution.

Aspen Structural Stage

Structural Stage	**Acres**	**Percent of Aspen Area (TAA)**
Seedling/Sapling 0-4.9"	2077	10%
Pole 5-8.9"	4,499	22%
Mature/Large	13,030	63%
Over mature/Very Large	1,120	5%
Total Acres	*20,726*	*100%*

Timber Health/Insects and Disease

A determination of insect and disease epidemic has been made by the Forest Supervisor. This determination was made through consultation with the Gunnison Forest Health Service Center. The Service Center has conducted numerous site visits on the Mancos/Dolores District since 2005, and has documented the onset and spread of SAD across the District. In addition, they have a paired plot research study on the District to study SAD. With the onset of Sudden Aspen Decline (SAD), the percentage of dead and diseased aspen in many stands is increasing. Aerial flight surveys conducted by the Gunnison Forest Health Service center detected approximately 30,000 acres of SAD on the Mancos/Dolores District with a good portion (11,673 ac) of those acres in the project area. SAD is caused by a combination of three interacting factors. Predisposing factors are low elevations, south to west aspects, open stands and mature trees. Inciting factors are hot, dry conditions of 2000-2005, and possibly earlier stressed trees. Contributing factors are secondary insects and diseases that include *Cytospera* canker, poplar and bronze poplar borer and two types of aspen bark beetles. All of these agents were found with the quick plot inventory conducted on about 7500 acres of aspen in summer of 2008. Recent drought conditions, and pervasive disease pathogens and insects are combining to cause serious deterioration in the aspen forest over-story (Worrell and Mask, 2008).

Stand Characteristics from 2008 Aspen Inventory/Prioritizing Stands for Treatment

A quick plot stand exam was conducted on approximately 7518 acres on 201 stands of aspen across the analysis area. These stands were selected using the following criteria: they were identified as SAD affected aspen from aerial flight data, mature or over mature aspen with < 20% conifer, on <30% slope and within ¼ mile of a road. A subset of the inventory above was identified as potential harvest units. Criteria for this selection of harvest units included plot data and foresters' professional judgement for the degree of dead and dying (20-60%), lack of regeneration and merchantable volume **(** *see Proposed SAD Harvest Treatment Units Spreadsheet and Data Sheets*). The overriding silvicultural objective is to regenerate the aspen

through coppice clearcut harvest. Sideboards for this determination were that the stand having 20-60% combination of disease/mortality and below about 2000 sprouts per acre. The stands that have over 60% disease and mortality are probably too weak to regenerate, as much of the root system may have died with faded over-story. Those stands with less than 20% disease and mortality are less of a priority and could wait as the aspen industry can only harvest about 500 acres/year and there is only an estimated three year window for merchantability of dead and dying aspen. Some stands with a majority of dead over-story have showed signs of adequate regeneration and would be left to sprout on their own. Other stands show little or no signs of SAD and those will be left to grow and mature.

Old Growth

The data base for old growth on the San Juan Forest was checked for this project. Twenty Three old growth stands were found that had the full compliment of characteristics necessary to rate out as old growth under the San Juan Forest scoring criteria. None of the proposed harvest units fall within these stands.

Browse

Creating small or isolated patches of aspen regeneration can become attractive for deer, elk or livestock and concentrated animal use. Excessive browsing of aspen sprouts can deplete aspen root reserves, jeopardize successful regeneration, and threaten the survival of the aspen stand. As described in the wildlife section, this analysis area is not located in areas of elk concentration such as calving or winter range. As described in the range section, cattle rotate through most of the analysis area during the summer months according to grazing schedules. For this project, monitoring of post harvest conditions includes looking for excessive browse, and taking action to limit browse by wildlife and livestock if it is a problem.

Harvest Units Greater than 40 acres

As stated in the Purpose and Need - Historical Disturbance Patterns, there is an opportunity to mimic natural disturbance such as fire with larger patch size harvest units. Previous clear-cut units have varied between 10 and 40 acres, creating a patchwork of cuts and a swiss-cheese pattern on the landscape. Larger cuts would have a more natural appearance once regenerated. The largest harvest units will be approximately 109 acres in the Ramparts East area and many of the other harvest units adjacent to recently awarded timber-sale units, so the combined acreages were larger than 40 acres. The National Forest Management Act, and the Forest Plan require certain steps be followed for proposals where temporary openings created by clearcuts are greater than 40-acres. The steps include a 60-day public notice, and review and approval by the Regional Forester. During the scoping period, the size of potential openings was described in the news release and scoping package that was available on the web, to be picked up at the office or mailed on request. This public announcement of the proposed sizes of coppice clearcut met the requirement to provide 60 days public notice prior to decision. In addition Regional office approval was asked for, and granted, for the harvest units greater than 40 acres (see RO request and approval letters for openings greater than 40 acres in project file).

Affected Environment

Proposed treatment units are broken into four areas. These four areas were first identified during the inventory phase as Haycamp, Caviness, Rampart and Chicken Creek, which was later re-

named Spring Creek. Tentative timber sale (T.S.) boundaries were drawn to include five sale areas which are listed along with the inventory area below.

Haycamp Mesa area (Morgan Gulch T.S.) is a broad flat mesa, defined by the Dolores river on the north and Lost Canyon on the south. This area is relatively healthy with some SAD components. Proposed coppice clearcut units are Haycamp Units 3, 20, 22, 24, 31, 47, and 49 for a total of 201 acres. Harvest units include up to 20% conifer (Douglas-Fir, Blue Spruce, Subalpine Fir, some scattered Englemann Spruce depending on elevation). Aspen are mature and large size class with some medium sizes. Aspects of proposed treatment unit are southeast, southwest and west and unit slopes range from 5-22% with most units 5-10%. All proposed units are on lands within the suitable base for timber production.

Spring Creek area (Spring Creek and Turkey Creek T.S.) is defined by Lost Canyon on the north and the West Mancos River on the south. This area contains the largest SAD component, and where SAD first started in 2005. Most stands are pure aspen with scattered ponderosa pine/Gambel oak, blue spruce or Douglas-fir depending on elevation. Proposed coppice clearcut units are Spring Creek Units 1, 2, 3, 7, 10, 15, 20, 22, 23, 37, 39, 40, 41, 43, 45, 46, 51, 52, 62, 77, 78, 80, 81, 82, 83, 84, and the proposed Mastication Unit MB1 for a total of 947 acres. Slopes are mostly 5% with some up to 17% at on south, southeast or southwest aspects. Unit areas within the suitable base for timber production and soil map units.

The proposed mastication unit is a stand of mid elevation (8800 ft) ponderosa pine, Gambel oak and fading aspen. This is a transition zone between pine and aspen, with a component of Gambel oak. These stands lie adjacent to a private parcel with home sites. In addition, many of the other units in the Spring Creek area are adjacent to or near private lands, where it is desirable to maintain a "greenbelt" in which fire burns with minimal intensity.

Rampart area (East Rampart T.S.) is defined by the West Mancos River on the north and the East Mancos River to the south. Most of the aspen at or above 9000 feet is healthy, with small patches of mortality in over-mature trees. As elevations drop towards the west and Rampart Hill and north of Box Canyon, levels of SAD dramatically increase with extensive mortality in the medium size stands. In the Rampart Hill/Box Canyon areas, mature ponderosa pine and Douglas –fir occur in patches or as large, old individuals. At the higher elevations, patches and interspersed Engelmann Spruce and Subalpine fir make up 10-20% of the stands. Proposed coppice clearcuts are Rampart Units 1, 10, 18 and 19 for a total of 298 acres. Proposed prescribed burns are located on Rampart Hill and Box Canyon. Slopes range from 5% to 15% on west, or southwest aspects. The silvicultural objective here is to mimic larger natural disturbance patterns by cutting mature aspen that lies in-between past regeneration units.

Caviness Mountain area (Caviness Springs T.S.) is defined by the East Mancos River to the north and a railroad grade above Hwy. 160 on the south. SAD is evident in many of the mature stands with some successful regeneration. Proposed coppice clearcut units are Caviness Units 4, 36, 39 and 40 for total of 178 acres. Slopes range from 5% to 20% on southeast, south or southwest facing slopes. Soil map units are 620 and 618. Stands are mostly pure aspen with scattered ponderosa pine and Gambel oak.

Effects

No Action – Expected Disturbance – there is no use of mechanical equipment under No Action. Aspen stands would continue to decline due to SAD, along with an increase in larger size class and older age distribution.

No Action – Stand Conditions**:** Taking no-action in the areas proposed for coppice clearcut under Alternative B, results in those areas' continued decline. The No-Action alternative would result in a continuation of SAD in all of the stands. The disease agents associated with SAD are known to spread by wind (*Cytospera* canker), and insect populations are known to expand rapidly (borers and bark beetles). The stands proposed for treatment have less than 20% conifer, so they are not expected to convert to conifer forest types. However, lower elevation areas may see an increase in the oak component.

This project focuses on mature aspen stands affected by SAD on approximately 12,000 ac in the project area. Expected mortality in these stands within 5 years is approximately 50% (Krabath, pers. comm. 2009). In many SAD affected stands, roots are in poor condition and there is no substantial regeneration in response to overstory mortality (US Forest Service, Rocky Mountain Region, Forest Health Management, February 5, 2009). In general, regeneration in untreated SAD stands is lower than regeneration in healthy, uncut mature stands (Worrall et al. 2008). It is expected that without treatment, 75% of the SAD stands would regenerate to a minimum level that meets Forest Plan Standards (Krabath, pers. comm. 2009). The Standard states that minimum adequate regeneration of aspen is achieved when 75% of the stand regenerates at a minimum of 300 seedlings/ac and that desired regeneration is 100% of stand regenerating at 600 seedlings/ac (San Juan LRMP 1992, p. III-45). Stands with minimum seedling density would mature into a very open aspen overstory with approximately 100 mature trees/ac; only 33% of the desired overstory stocking of approximately 300 trees/ac (Krabath pers. comm. 2009). In addition, there may be stands with little to no aspen regeneration that would convert to shrublands, or to open parks dominated by grasses and forbs. Environmental consequences of this scenario are adequately addressed under the *Ecosystem Values Report* in the project record file.

The patch size of past regeneration harvests varies from 5 to 40 acres, and no new treatment units are located in the interspaces. Under No Action, the sparse or patchy regeneration that may result, detracts from the patch size of the future aspen forest. There would be less of a contiguous canopy of aspen over time.

Taking No Action in the areas proposed for mastication results in extensive patches of dead and dying aspen trees. Regeneration of aspen suckers is expected to be patchy and sparse. Oak, pine Kentucky bluegrass, native grasses and forbs would remain on site and would likely increase in cover where open aspen mortality occurs. With no action, the units selected for coppice clear-cut and mastication treatment would likely lose much of their live aspen component. As a result, dead/down woody material and standing dead trees would contribute to increased fuel loads, which results in more intense wildfires under extreme burning conditions. Fewer patches resistant to fire, spread across the landscape, would reduce the fire management options for wild-land fire.

Under No Action, the acreage of young to mid-aged aspen that is more resistant to insect, disease and intense wildfire is as follows.

3,468 acres past regeneration
718 ongoing harvest
4218 seedling/sapling or pole size aspen, resistant to insect or disease
= 20.1% of aspen cover type.

Alternative B (Proposed Action) – Disturbance: Alternative B includes the use of logging equipment, trucks, and hyrdomow equipment in the treatment units sometime over the next 10 years. Disturbance in the form of coppice regeneration harvest is the best option to maintain aspen cover type on sites affected by SAD. The first sale would occur in the Spring Creek area, and would begin in 2010. Most activity would be concentrated in the first 5 years of implementation. Coppice clearcut could occur in the summer, fall or winter depending on ground conditions and coordination with other resources. After harvest, follow-up burning may occur at selected units prior to the next growing season.

Alternative B (Proposed Action) – Stand Conditions: Regeneration potential for aspen should be good across the treatment units under the even-aged coppice clear-cut harvest method. Exceptions to this could occur in limited areas, such as at log landings, where excessive soil compaction occurs, and from snow damage, diseases in the new sprouts, and/or excessive browsing by big game. Stands selected for harvest have no less than 40% live over-story trees, and this should induce enough coppice regeneration to regenerate the stand. If during layout of the treatment units, the over-story is not 40% live, alternative treatments to clear-cut such as mastication, root ripping or burning may be used to enhance regeneration. It is estimated that approximately 10% of the harvest treatment units (150ac) may not meet minimum stocking requirements (300 trees per acre over 75% of area). These units would be planted with Ponderosa Pine and Douglas fir at lower elevations and Engelmann spruce at higher elevations if needed to maintain a forested stand.

In five years after harvest, Alternative B results in 1,550 acres of seedling/sapling size aspen that are more plentiful and resistant to insects and disease than under No Action. Suckering response would not be that of a healthy stand, but should produce suckering in the realm of 1000 to 4000 sprouts per acre and future aspen stands may grow with less self thinning required. Reserve clumps would be located in or adjacent to all of the aspen harvest units and comprise 10-15% of the unit acres. These clumps would provide snag habitat for wildlife, diversity in species composition with conifer inclusions and diversity in visuals for scenic quality. In five years the reserve clumps would contain a mix of conifer, with dead and some live aspen trees. Some live mature aspen are expected to occur in the reserve clumps in the Haycamp and Rampart areas, but very few live mature aspen are expected in the reserve clumps in the Spring Creek or Caviness areas due to the extent of SAD.

Clearcutting does not increase understory species diversity, as with fire, and may stimulate shrub production versus the increase in grass and forb production that occurs after fire (Bartos and Mueggler 1982). However, aspen stands are known to support a lush, diverse understory

community (Reynolds 1969) and it is expected that clearcutting would maintain the stands at such a level that their structure and function would sustain this diversity.

Although the exact acreages of historical wildfires is unknown, the aspen on this landscape suggests that historical fires would have covered 100's and up to 1,000's of acres. A GIS mapping exercise estimated the combined patch size of existing sapling, pole and mid-aged stands up to 30 years old, with the proposed coppice clearcuts. This map showed contiguous future aspen forest patches from 60 to 400 acres. These aspen forest patch sizes more closely mimic historical disturbance patterns such as wildfire.

The mastication area is a 70 acre stand, and potentially the two adjacent harvest stands may be added if not viable as harvest units for total of 140 acres. Immediately following mastication, and before the first growing season, a cool prescribed fire should carry through the mulch and natural fuel layer to stimulate aspen regeneration and reduce the dead fuel layer. Fire should carry where surface fuels from the mastication and natural fuels are continuous. This would occur predominately under the ponderosa pine where leaf litter is present, and in pockets of masticated dead aspen. Within five years after mastication and follow up burning, there would be patches of seedling/sapling aspen more resistant to insects and disease. Larger dead woody material is greatly reduced, compared to No-Action, and would recycle quickly into the duff and soil layers. Overall risk or potential for severe fire is reduced adjacent to private property.

Increasing the overall amount of young aspen forest provides for areas less prone to high-severity fire behavior. Alternative B would help to create more patches of early seral aspen across the analysis area. Many of the new treatment units tie into previous aspen coppice harvests in an attempt to increase the patch sizes of early seral aspen. This is important because it would help to mimic more natural patches that would have been expected from disturbance, such as fire. Larger patches of vigorous aspen help to create a "greenbelt" where fire is unlikely to burn with much intensity except under the most extreme fire conditions. Patches resistant to fire spread help to limit the spread and intensity of wildfires and give fire managers more options to manage fire in an effort to create or maintain even more aspen patches in the future. Coppice clearcuts in the Spring Creek area lie near and adjacent to private land, summer homes, cabins, and recreational facilities, and the resulting aspen regeneration would help protect these areas from undesireable fire effects.

Most of the stands proposed for treatment have a large population of disease and insects. Harvest of these stands would reduce the population of insects and disease that are associated with the mature trees and the subsequent sprouts and saplings should be healthy and vigorous trees.

Cumulatively, this project would add to the total amount of young to mid-aged forest that is more resistant to insect and disease as follows,

3,468 acres past regeneration
718 acres ongoing regeneration cuts
1,550 acres regeneration under Alternative B
5736 acres of seedling/sapling or pole size stands or 27.6% of aspen cover type.
Increase of 7.5% compared to No-Action

3.2 Forest Health and Vegetation (Landscape Burn Areas)

Conclusions below are summarized from the Fire Report, Fuels Input, and Vegetation Report located in the project file.

Background

Fire is a natural method of maintaining aspen and other forest ecological systems. Many aspen stands are even aged due to a single large fire event that moved through the stand at some point in time. It appears that moderate intensity fires in quaking aspen, that kill most or all of the over-story, stimulate very adequate suckering. 12,100 to 60,700 suckers per acre were produced after burning several sites in western Wyoming. In addition, after a decline during the first post-burn year, Bartos and Mueggler (1979) measured an increase in herbage production for several years on the burned sites.

The objective of these burns is to create enough fire intensity across the units to kill many fading aspen stems and stimulate sprouting, while also improving native grass and forb production. Blackened soil captures warmth from the sun that can help sprouting.

Because aspen forests do not burn readily, the prescription window often occurs in the fall and is often not open very long. When conditions are dry enough, as usually occurs from September to November, aspen stands with an under-story of conifers or shrubs may burn intensely.

Proposals include the use of hand crews, chainsaws, drip torches and ATVs for light line construction if necessary. Prescribed burning would occur when weather and ground conditions are desirable, likely in late fall. Due to the remote nature of Box Canyon a helicopter with aerial ignition is likely. Prescribed fire units would be designed using natural barriers or fire line in order to maintain the fire within the burn unit. This will help to ensure a safe prescribed burn, while also meeting the prescribed fire project objectives to improve aspen.

Affected Environment

The Box Canyon area (800ac) is a relatively flat mesa at higher (average 9200 ft) elevation, surrounded on 3 sides by canyons. The burn area lies north of Box Canyon, and south of the West Mancos River. This area is a mix of mostly aspen, with some shrub component and patches of mature ponderosa pine, Douglas-Fir and Gambel oak. Much of the aspen is in poor health. This area is essentially un-roaded due to road closures to protect the watershed. Prescribed fire would promote aspen regeneration and grass and forb production.

In the Box Canyon Burn (approximately 800 ac), there is a wide mix of vegetation that occurs across a large mesa with 0-10% slopes on a westerly aspect (see table below).

Box Canyon Burn Cover Type

Aspen	526 ac	63%
Shrub	190ac	23%
Grass	62 ac	7%
Ponderosa Pine	32 ac	4%
Forb	18 ac	2%
Douglas Fir	11 ac	1%

There is a range of mortality in the aspen stands as seen from distant views and airphotos.

The Rampart Hill area (200 ac) is another flat mesa at higher elevation (average 9300 feet) with a mix of aspen and shrub species. Aspen/snowberry forests, with interspersed Kentucky bluegrass openings, cover much of the area. On the southern and westernmost edges, vegetation transitions to Gambel oak and native bunch grasses. Large old ponderosa pine, Douglas-fir and Limber pine line the western edge of the mesa. Aspen stands consist of mid-sized trees with heavy mortality, some of which have fallen over.

Effects

Alternative A (No Action) – In both the Box Canyon and Rampart Hill area, SAD affected stands are expected to show very high levels of mortality in 1-5 years. Regeneration may be slow, sparse or patchy, and may be limited to swales, small draws or other moister sites. Some areas may convert to snowberry cover type, and Gambel oak may expand into other areas. Mature ponderosa pine, Douglas-fir and limber pine would remain the same in 1-5 years. Loss of aspen cover may cause additional drying on exposed sites. Ground cover should remain constant, but leaf litter from aspen may be less widespread depending on regeneration.

Potential fire behavior in shrub lands with dead aspen fuels present would be expected to be greater than live aspen stands. This is due to increased dead fuel load and drier fuels as a result of the lack of green aspen canopy to maintain shade and shelter from the wind all summer.

In the long term, a large and high-severity wildfire may eventually occur in these areas. This would be of benefit to the aspen, however a large fire may not occur for decades, in which time SAD would reduce the aspen health even further making any remaining root systems much less capable of a positive and healthy response.

Alternative B (Proposed Action)
Fire effects would vary by cover type, aspect, slope and wind direction at time of the burn. All these parameters along with smoke would be detailed in the burn plan and followed at time of burn. Fire effects would be a mosaic of burn intensity and consumption.

In most aspen stands in the Rampart Hill and Box Canyon areas, the stocking of shrubs or conifers is absent to only moderate. These stands would still support fire and rate of spread due to fallen dry leaves, dead herbaceous fuels, and dead and downed timber. Grass would carry a surface fire if cured with consistent cover. In both areas, some grassy openings are native bunch grasses likely to burn and carry fire, and other grassy openings are short Kentucky bluegrass that would be less likely to carry fire. Where ponderosa pines occur, surface fuels and pine litter should burn more consistently. Winds or terrain may help carry fire through some of the shrub layer.

The aspen ecosystem relies on disturbance to rejuvenate itself, and these landscapes would benefit from fire and resulting increases in aspen regeneration and grass and forb production. In addition, with the reintroduction of fire on these landscapes under a prescribed manner the effects and intensity of a future wildfire would be decreased.

Burned acres should be rested from domestic grazing at least two growing seasons after fire in order to protect the new, fragile yet highly palatable growth of grasses, forbs, and shrubs from grazing impacts. While re-introducing fire would have positive short- and long-term effects on vegetation, including forage species, the combination of fire and livestock grazing could have adverse effects on upland vegetation and watershed health if not properly managed. Potential effects include: undesirable changes in species composition, increased bare ground, and increased erosion. It would be important to first assess whether the new grazing management strategies are effective in addressing existing issues. Then, work with the grazing permittee to schedule rest in affected pastures post-burn. If problem areas are not showing adequate improvement, and/or it is not possible to rest the pasture after burning, the prescribed burn should be postponed until those conditions can be met (see Design Features in Appendix B).

Box Canyon

Over the entire landscape, fire is expected to carry on 40-60 % of the area, with ground fuels and dead material in the 1 to 10 hour fuels size consumed at similar percentages. The Box Canyon mesa top has two small draws, one that flows into Box Canyon and the other drains into the West Mancos. These draws may carry a little more heat and fuel consumption due to more slope and vegetation however, design features include lighting methods that cause fire to back into these draws. Large ponderosa pine, Douglas-fir, limber pine and larger Gambel oak may receive burn and scorch, but should experience very little mortality except in patches. Fire kill of aspen overstory would range from 10-35% or more in the years following the burn. The aspen forests of Box Canyon likely originated from historic wildfires, and re-introducing fire to these landscapes may maintain some aspen on these sites. The exact mosaic of aspen in the long term is hard to predict because drier, hotter climate trends are expected to continue to affect the new generation of aspen. However, even if long term aspen success is sparser then existing stands, fire can also enhance the growth of understory grasses, forbs and brush. Conifer regeneration may increase in some areas.

Rampart Hill

Similar to Box Canyon, a mix or mosaic of fire intensities and effects are expected. Low fire intensity should occur in a patchy mosaic in areas of pure aspen and snowberry. Aspen tree mortality should be from 10-35+% in the years following the burn. Low to moderate fire intensity is likely where ponderosa pine, grass, and Gambel oak are present. Heat from the oak and snowberry areas may help carry fire through the neighboring aspen. The fire should consume 1, 10, and 100 hour fuels that would reduce the intensity of future wildfires. Large ponderosa pine, Douglas-fir, and limber pine should remain after the burn with some evidence of bark and needle scorch, but otherwise little mortality.

For the Rampart Hill area, under recent drying trends, even pole size aspen are declining. The prescribed fire may help regenerate new sprouts more resistant to SAD agents, but these may also decline at an earlier age than higher elevation areas. It is likely that fire created these aspen patches in the first place, and because of the prominent location and likelihood of lightening on the ridgeline, the rotation age of aspen regenerated by fire disturbance may be a younger age than surrounding areas. Pole size aspen add organic material, provide shade, and add to the diversity of the area.

3.3 Air Quality (smoke)

Background

Smoke is managed under permit with the State of Colorado Division of Air Quality. A smoke monitor is assigned to each prescribed burn to evaluate, record and document smoke dispersal and mixing, and to inform the prescribed fire burn boss of smoke related issues. Generally, prescribed burning would only occur when smoke impacts to the local communities would be minimized. Smoke permit stipulations include the time of day prescribed burning would be allowed, the number of acres burned in a day, the smoke dispersal requirements, and wind direction.

Effects

The prescribed burn areas are not located within a Class 1 airshed. Air quality surrounding the project area is generally good. Invariably, some smoke would settle into the Mancos and Montezuma valleys during the night due to prevailing down slope and down valley winds associated with the San Juan Mountains. Smoke in the communities, and along Hwy 184 and Hwy 160, may occur for 2-3 evenings following either of the two burns. Short-term air quality degradation and reduced visibility may be experienced. Burning may coincide with summer/fall recreation such as hunting, driving and camping, causing short term displacement of recreationists in the burn areas for 2-3 days.

Part of the planning for these burns would include evaluating weather systems that can provide post burn moisture and these same weather events may include winds favorable to moving smoke away from communities. Cumulatively, smoke may occur at the same time as burning on nearby private land.

Generally, emissions from prescribed fires can be controlled within acceptable limits, while emissions from a wildfire tend to exceed air quality standards in both quantity and duration. The effects of smoke would be mitigated by burning only under smoke dispersal/air quality requirements permitted by the State of Colorado (see Design Features Appendix B).

3.4 Carbon Sequestration

Background

National Forests and Grasslands both capture and store carbon. Young rapidly growing forests, once established, can remove carbon from the atmosphere at higher rates than older forests, while older forests may capture less carbon, but are able to store large volumes as biomass for long periods of time. Even with new tools, project level carbon consequences (short term emissions versus long term sequestration) cannot be translated into large-scale climate consequences of any degree or reliability. Therefore, this discussion centers around the difference between the alternatives for carbon capture and storage, and does not attempt to extrapolate what those difference may mean for the climate overall.

Effects of Alternative B (Proposed Action)

The harvest of live trees via coppice clearcut would reduce existing carbon stocks on the treated units in the short term. These stands wouldl remain a carbon source (i.e. emitting more carbon then they store) until new trees are established and the carbon uptake by the new trees exceeds the emissions from the decomposing dead organic material. As the stands continue to develop, they will capture more carbon from the atmosphere than is emitted by the logs on the forest floor. This situation occurs while the stand is young, and mid-aged and carbon capture begins to decline as the trees reach maturity (around 60 years of age). Stands would then capture carbon more slowly, and store their captured carbon until such time as the stand is clearcut again or if another disturbance sets back the stand.

Continuous canopies of aspen forest reduce the potential for extreme burning conditions as described above. Severe wildfires emit greenhouse gases at a much greater rate then controlled burns. The prescribed burns would create short-term emissions of greenhouse gases in the form of smoke, as described in the Prescribed Burn sections of this EA.

Effects of Alternative A (No Action)

Because of SAD, carbon emissions from the treatment units are expected to occur as trees die, fall over and decompose as a result of SAD. Carbon may be lost more slowly than under Alternative B, as SAD related mortality could take up to 5 years for an entire stand. Regeneration is expected to be sparser, patchier with fewer trees overall, so that the carbon capture and storage is expected to be somewhat less than Alternative B. Where other species such as conifer or shrubs fill interspaces these species would add to carbon capture and storage.

The potential for severe wildfire effects is somewhat greater than Alternative B, due to a lack of long term continuous aspen canopy and dead/down material from dying trees. However, there is also no short-term emission of greenhouse gases via prescribed fires under this alternative.

3.5 Sensitive, Threatened, Endangered, or Proposed Species

Background

No habitat is present for any threatened, endangered, sensitive or proposed plant species within the treatment units. There are no endangered wildlife species with potential habitat within the analysis area. One threatened species, the Canada Lynx, has suitable habitat in the analysis area or may be potentially impacted by the proposed alternatives.

The following sensitive species; American marten, Townsend's big-eared bat, flammulated owl, northern goshawk, olive-sided flycatcher, Peregrine falcon, purple martin, three-toed woodpecker, Lewis's woodpecker, western boreal toad, northern leopard frog, and the Great Basin silverspot butterfly have potential habitat within the analysis area. Of this group, the flammulated owl, Lewis' woodpecker, northern goshawk, olive-sided flycatcher, purple martin, three-toed woodpecker, and northern leopard frog are potentially affected by the project.

Effects of Alternative B (Proposed Action)

The following are conclusions. Additional details about the direct, indirect and cumulative effects are located in the biological assessment/biological evaluation in the project file.

Canada Lynx

It has been determined that implementation of the proposed action in the analysis area may affect, but is "not likely to adversely affect", the Canada lynx. This is based on the following facts:

1. Denning habitat would not be affected by Alternative B.
2. The 4% of "other" lynx habitat that would be affected would only be affected in the short term before it would again provide prey habitat.
3. Recreation, fire, roads, trails, or snow compaction have not had an adverse impact on lynx habitat suitability.
4. The project area is not in a key landscape linkage.
5. Aspen timber harvest could affect lynx habitat, but it would have discountable effects, specifically aspen regeneration which is one component of hare/lynx foraging habitat.
6. The loss of prey habitat from harvesting "other" habitat would be short term (3-10 years).
7. There would not be a conversion of lynx habitat to unsuitable habitat.

Northern Goshawk

This alternative, when considering the direct, indirect, and cumulative impacts, would not likely contribute to a trend towards federal listing, or cause a loss of viability to the population or species. This determination is based on the following rationale:

1. A total of 784 acres of potential nesting habitat for this species are proposed for harvest from the approximately 11,891 acres of nesting habitat in the analysis area. The loss of this amount of habitat is small, considering the amount of suitable nesting habitat within the analysis area and across the Forest.
2. Under all alternatives, the majority of preferred habitat would be maintained. Although the alternatives may adversely impact individuals, they would not likely result in a loss of viability on the analysis area, nor cause a trend to federal listing or a loss of species viability rangewide.
3. All units proposed for harvesting under the Alternative B would be surveyed for goshawks prior to harvest. If a goshawk nest is found design features listed in Appendix B would be followed to provide for nest habitat.

Flammulated Owl or Lewis's Woodpecker

Both flammulated owls and Lewis' woodpecker require mature aspens trees for nest cavities, Alternative B, would not likely contribute to a trend towards federal listing, or cause a loss of viability to the population or species. This determination is based on the following rationale:

1. A total of 1,152 acres of suitable habitat for these species are proposed for harvest. However, the loss only consists of 3% of habitat within the analysis area. These acres would return to suitable habitat in 60 years.
2. Under all alternatives, the majority of preferred habitat would be maintained. Although the proposed action may adversely impact individuals, it would not likely result in a loss of viability on the analysis area, nor cause a trend to federal listing or a loss of species viability rangewide.

3. Design features that include leave clumps help maintain habitat.

Purple Martin

Alternative B would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species on the forest. This determination is based on the following rationale:

1. It is anticipated that aspen stands declining from SAD would result in a low density of sapling recruitment. Timber harvesting can be used to mimic natural disturbance, improve aspen recruitment, and provide future nesting habitat.
2. The two known nesting colonies within the treatment units would be protected from project activities. All potential nesting habitat within the analysis area would be surveyed prior to treatment. All active nesting habitat would be protected with a 150 foot buffer.
3. Except for the one burn treatments where nesting colonies are present, there are no other known nesting colonies in the other treatment units.
4. Only 114 acres (10% of nesting habitat within the analysis area) of potential nesting habitat would be affected. No alternative would likely result in a loss of viability on the analysis area, nor cause a trend to federal listing or a loss of species viability rangewide.

Northern Leopard Frog

This project would not directly, indirectly, or cumulatively impact the northern leopard frog and would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Design features that are part of Alternative B (listed in Appendix B) for riparian/wetland avoidance will protect habitat for the species. The project would have no impact on the Northern leopard frog.

Effects of Alternative A (No-Action)

The difference between Alternative A (No Action) and B (Proposed Action) is approximately 3,000 acres of vegetative treatments (harvest, mastication or prescribed fire) versus no treatment on those same acres. On those acres under No Action, tree mortality is expected to continue with slow and spotty aspen regeneration. When compared to Alternative B, this may create a long term decrease in mature aspen, and therefore a decrease in nesting habitat for northern goshawk, flammulated owl, Lewis's woodpecker and purple martin on those acres.

There are no effects to Canada Lynx habitat under the No Action alternative. Aspen are expected to continue to die, accompanied with slow and spotty regeneration.

Similar to Alternative B, the No Action Alternative creates no impacts to the Leopard Frog.

3.6 Birds of Conservation Concern

Birds of Conservation Concern (BCC) are either migratory or non-migratory birds that have been designated for special attention because of population declines, naturally small ranges of population sizes, threats to habitat, or other factors. In addition to the flammulated owl and Lewis's woodpecker discussed above, the Williamsons' sapsucker is a bird of conservation concern.

Effects of Alternative B (Proposed Action)

There would be a decrease in the amount of dying and diseased trees, and some foraging habitat, which includes coniferous forests. Retention of snags through project design would provide for protection of some snags and future snags. Because the majority of the habitat would be maintained, and the analysis area is a small portion of the overall habitat of the Williamson's sapsucker, project impacts are not expected to measurably impact the population.

Effects of Alternative A (No Action)

Same as effects described for flammulated owl and Lewis's woodpecker above.

3.7 Management Indicator Species

The paragraphs below summarize information for management indicator species. Additional information is located in the Management Indicator Species Assessment located in the project file.

Background

The MIS addressed in detail include elk, green-tailed towhee, and hairy woodpecker. The project area consists of habitat utilized by these species. The MIS selected were chosen to display changes in habitat that would occur due to the proposed action. For example, for those species dependent on cover and forage, elk was selected. The hairy woodpecker represents changes in snag and mature trees. Green-tailed towhee was selected to analyze changes in the shrub component.

Effects of Alternative A (No Action) and Alternative B (Proposed Action)

The proposed project is not likely to result in a loss of viability or cause a trend to federal listing or loss of species viability range wide.

Elk: Ninety two percent of the analysis area provides foraging and cover habitat for elk. The optimal forage to cover ratio is 60:40 and current conditions in the analysis area are 43:57. Although aspen is known to provide productive elk reproduction areas, there is not a primary elk calving area within the analysis area (CDOW elk-calving GIS coverage). Alternative A (No-Action) in the short-term shows little change, in the long-term, effects of SAD may result in a decrease in cover if the effects of SAD result in conversion to a grass vegetation type. This could shift the forage to cover ratio to 29:71 within the treatment units, closer to desired conditions. Under Alternative B (Proposed Action), the forage to cover ratio would be 29:71 in the aspen treatment units. Because of quick regeneration, forage habitat converts back to cover in 10 years. Temporary roads could impact elk if they are used by the public especially during hunting season. This is a short-term impact because temporary roads would be obliterated after harvest. Actions considered for cumulative effects analysis for this species included cattle grazing, recreation and road use and the Turkey Knolls and Upper Lost timber sales. Cumulatively, there may be a slight decrease in elk numbers within the analysis area for the short-term and no change in the long-term.

Green-tailed towhee: This species forages on the ground and in low shrubby vegetation, thus its link to the mountain shrub community which includes aspen seedlings/saplings. Under Alternative A (No Action) there is less contribution to additional seedlings/saplings than Alternative B (Proposed Action). Regeneration may occur in a sparse, patchy manner, less optimal for this species. Snowberry patches however, are not affected by Alternative A. Under Alternative B, in the short-term, dense aspen regeneration provides excellent habitat. Towhees are also found in dense snowberry understories of mature aspen stands, and Alternative B would reduce this habitat by 825 acres (4% of analysis area) and within 1-5 years replace the habitat with aspen seedlings/saplings. Prescribed burning causes short-term losses of snowberry habitat, however, within several years, this habitat would return as dense aspen regeneration occurs, or where snowberry is only partially consumed and grows back. In the long-term, as seedlings/saplings mature, habitat returns to post-harvest or post-burn conditions. Cumulatively, the Upper Lost and Turkey Knolls Timber Sales increase habitat in the short-term through aspen regeneration.

Hairy woodpecker: This species is associated with areas of large-diameter snags over 12 inches diameter. Forty-one percent of the analysis area contains stands of large trees that potentially contain nest-cavity trees for hairy woodpeckers. A wide variety of other species depend on abandoned hairy woodpecker nest cavities. Under Alternative A (No-Action) habitat remains the same. In the long term, SAD related mortality may result in a decrease in the amount of habitat available. In the short-term, Alternative B reduces habitat by five percent. Within the treatment units, there would be a reduction of habitat quality such as snags, stand densities and canopy closure. However, there is a sufficient amount of snags within non-harvested areas. The loss of habitat would last approximately 70 years, until regenerated trees mature to create large snags. Cumulatively, past logging and firewood cutting has added to habitat reduction, however, due to the low percentage of habitat impacted, hairy woodpecker populations would continue to exist in the analysis area.

3.8 Cultural Resources

Cultural resource report information is located in the project file. Consultation with the State Historic Preservation Office and Consultation with American Indian tribes is complete.

Background/Affected Environment

Both historic and prehistoric sites are known to occur within the Aspen Forest Health and Restoration Project analysis area. Prehistoric site types found in this area include small seasonal-use campsites, resource procurement sites, and Ancestral Puebloan habitation sites. Historic properties include sites related to early mining, logging, and ranching activities.

Effects of Alternative A (No Action)

This alternative would help to protect any undiscovered sites (eligible and needs data sites are protected during projects as described under Alternative B). However, since the aspen stands targeted for treatment are already diseased and failing, there is a chance that dead trees could impact sites by falling on structures or features, or by the pulling up of the root ball. There is

also concern that allowing the stands to deteriorate could add substantially to fuel loading, creating a risk of hotter wildfire that could impact cultural resources.

Effects of Alternative B (Proposed Action)

All treatment units have been intensively surveyed for cultural resources. Cultural resources sites within the area of the treatment units that have been determined eligible to, or are currently unevaluated (need data) for, the National Register of Historic Places would be protected by avoidance and/or flagging during project activities. Aspen stands tend to have poor or limited ground visibility due to dense understory vegetation and duff, so that even intensive survey efforts may not locate all cultural resources present. Due to the amount of ground disturbance that would occur during project activities, Alternative B (Proposed Action) has the potential to damage any undiscovered cultural resources that may exist within the project units. Mitigation measures include immediately reporting any new discoveries found during implementation to the Forest archaeologist for evaluation and avoidance.

Some trees within the aspen harvest units bear historical aspen carvings (arborglyphs). These trees would be evaluated by the archaeologist and protected as cultural sites if they are of historical interest.

As long as all recommended design criteria and mitigation methods are implemented, the proposed Aspen Forest Health and Restoration Project, regardless of the final alternative selected, should have *No Adverse Effect* on any cultural resource properties on or eligible for listing on the National Register of Historic Places.

Since there are no adverse effects from this project that would combine with the effects from any other known past, present or future foreseeable projects, this project would not contribute to any cumulative effects.

3.9 Watershed Health

Background

The analysis area is primarily contained within five main watersheds (6th level Hydrologic Unit Code): Upper Lost Canyon, Chicken Creek, West Mancos River, East and Middle Mancos River, and Upper Cherry Creek. Known perennial streams include: Box Canyon, Cherry Creek, Chicken Creek, Deer Lick Creek, Fish Creek, Horse Creek, Lost Canyon Creek, East Mancos River, Middle Mancos River, Silver Creek, Starvation Creek and West Mancos River. An extensive network of intermittent and ephemeral streams is present throughout the analysis area. Numerous springs, seeps, and other water bodies exist as well. Riparian areas are associated with many of these water sources and with all perennial streams. A Watershed Report is located in the project file and conclusions from that report are summarized here.

A portion of the analysis area includes the Mancos Valley Source Water Protection Area (SWPA). This delineated area encompasses large portions of the West and Middle Mancos River watersheds, and fully includes the Box Canyon watershed. It defines the region where the Town of Mancos Planning Team has chosen to implement its source water protection measures

to reduce source water susceptibility to contamination (Draft Mancos Source Water Protection Plan 2009). The Mesa Verde surface water intake is located within approximately 0.2 miles of the proposed Box Canyon prescribed burn unit. This is the closest intake to any proposed activity. The remaining intakes for the SWPA are several miles downstream of any proposed treatment unit. Groundwater sources within the planning area include wells at the Transfer Picnic Area and the Transfer Campground.

The State of Colorado establishes classifications and numeric standards for surface waters in compliance with the Colorado Water Quality Control Act. The classifications identify beneficial uses of the water. Beneficial uses for the Mancos River tributaries include cold water aquatic life, water supply, agriculture, primary contact recreation from May 1 to October 31, and not primary contact recreation from November 1 to April 30 (CDPHE-WQCD, July 2007, Regulation No. 34). Beneficial uses for the Dolores River tributaries are the same, except recreation is classified as existing primary contact use year round. Water quality parameters that may be affected by the proposed activities include dissolved oxygen, pH, temperature and sediment. Stream segments that are not fully supporting their designated beneficial uses are defined as impaired, and placed on the State's 303(d) List. The portions of the West and Middle Mancos River and its tributaries that are within the analysis area are listed on the current 303(d) list for excessive Zinc. No other stream segments within the analysis area are currently listed. However, Box Canyon Creek, a tributary to the West Fork Mancos River, was included on the 1998 Colorado 303(d) list because excessive sediment deposition resulted in the stream not supporting its cold water aquatic life use designation.

A Total Maximum Daily Load (TMDL) assessment addressing sediment was approved for Box Canyon Creek in June 2000 (Carlson 2007). The Box Canyon TMDL Evaluation Final Report (May 2007) concluded the following: the substrate composition, particularly in percent fine sediment, showed no evident improvement in the upper reaches; the substrate composition, particularly in percent fine sediment, showed improvement in the lower reaches; the macroinvertebrate community has a greater richness of taxa and mayflies, stoneflies and caddis flies throughout the entire stream length than in 1996; and, bank stability has improved with more stable banks in 2006 than there were in 1996. Based on these conclusions, it has been determined that the beneficial use of cold water aquatic life in Box Canyon is being attained for the lower reaches, and is being attained with impacts observed in the upper reaches. Box Canyon Creek was also assessed during a previous grazing analysis, and it rated Properly Functioning Condition in the lower reaches and Functional at Risk with an upward trend in the upper reaches. Trend was determined to be upward based on improved bank stability and improvements to the macroinvertebrate community.

For this analysis, any area that rated Functional at Risk with a downward trend or Nonfunctional riparian conditions was cross-walked with the proposed treatment units in this analysis. Only in the Box Canyon sub-watershed of the West Mancos River 6th level watershed do proposed treatment units and previously assessed adversely impacted riparian areas overlap. The overlap consists of two lentic riparian areas within the proposed Box Canyon prescribed burn unit.

Approximately 70 different soil map units were identified throughout the analysis area. Thus, soil characteristics such as texture, depth, and erosion hazard range widely. Map units 254 and

606 in the southern portion of the analysis area are highly sensitive to disturbance. Because proposed timber harvest activities are within the suitable timber base where slopes are less than 30%, these soil map units do not overlap with any proposed harvest activities. Nor do they overlap with any prescribed burn unit.

Effects of Alternative A (No Action)

Under the No Action alternative, there would be no ground disturbance from the proposed activities. Therefore, there would be no erosion or sediment delivery, and no increases in water yield at the local scale. Designated beneficial uses would not be affected for any stream within the analysis area, including Box Canyon Creek.

It is estimated that the stands that would have been treated under Alternative B would have 25% less regeneration than if they were treated with clearcut harvest. This may result in sparser, patchier stand conditions with more Gambel oak or ponderosa pine at the lower elevations, snowberry inclusions or mixed conifer at the higher elevations, or patches of native bunchgrasses or Kentucky bluegrass. If a stand was to become dominated by conifers, there would be increased evapo-transpiration rates from the evergreen needles, which means there would be less water available to produce understory vegetation, recharge soil profiles or contribute to stream flow. If conifers replaced aspen along riparian areas water temperatures could increase because conifers provide less shade to riparian areas, than aspen. Conifers intercept more snow than aspen but once snow is on the ground, evaporative losses are reduced. Portions of stands with a shrub and/or grass/forb community, with no conifer component, would experience a decrease in evapotranspiration rates, but because shrubs, grasses and forbs have shallower rooting depths, there would also be less recharge to soil profiles, and a reduction in contribution to stream flow. The openness of a shrub/grass/forb community could reduce snowpacks due to more surface area exposure allowing an increase in wind scour and an increase in evaporative losses.

In the units that would have been treated under Alternative B, standing and down fuels would accumulate at the lower elevations, increasing potential for high-severity wildfire. High-severity wildfires typically result in high soil burn severities. High soil burn severity results in increased runoff and soil particle detachment by water. Post-fire conditions that are the result of high soil burn severities lead to increases in erosion and peak flows, and can induce debris flows, all of which have the potential to impact native fish habitat, municipal water supplies, and infrastructure. See the Fire Risk section of this document for more discussion about potential for high-severity wildfire.

Effects of Alternative B (Proposed Action)

Aspen forests provide excellent watershed protection (DeByle 1985). Soils have high water holding capacity, high infiltration rates, and are nutrient rich. Cover under aspen is usually 100% if undisturbed, and aspen forests typically yield high quality water.

None of the proposed activities are expected to result in a detectable increase in total water yield or peak flows (see Cumulative Effects discussion). However, small localized increases in water yield may occur, and can be attributed to reductions in evapotranspiration and to surface runoff from compacted areas such as landings, skid trails and roads.

During and immediately after harvest, erosion is expected to occur on compacted areas such as landings and skid trails. Erosion is expected to temporarily increase as a result of new temporary road construction, and the increased use of existing open roads during implementation. Because proposed harvest units occur only in the suitable timber base, where slopes are less than 30%, erosion leading to sediment delivery to nearby streams is unlikely, except where roads are connected hydrologically to the stream. Decommissioning of nonsystem roads that are not currently vegetated and/or stable and reconstruction of roads with existing poor drainage will ultimately reduce erosion and sediment delivery. See the Roads section of this EA for miles of road work.

Erosion may increase after prescribed burns in patches where soil burn severities are moderate and high. Since prescribed burn objectives are to produce a mosaic of burn severities, erosion generated in moderate and high soil burn severity areas would be buffered by low and unburned areas which would keep sediment delivery to nearby streams low.

Mastication treatment typically reduces erosion due to the increase in ground cover after mulching.

The benefit of Alternative B is more aspen regeneration would occur in treated stands and at the local site, would yield the soil and water benefits gained from aspen forests.

Two lentic riparian areas within the proposed Box Canyon prescribed burn unit were previously identified with downward trend or nonfunctional. These may be affected by the Box Canyon burn, however, these areas are not expected to carry fire, or would burn lightly. As the harvest units are identified on the ground, and when they intersect with riparian areas the hydrologist will conduct field checks and recommend buffers as needed to avoid impacts to riparian areas. Design features also include buffers along perennial streams. Any root ripping that occurs near riparian-wetland areas would be done in such a manner as to prevent sediment from entering the riparian-wetland area.

For all but Box Canyon Creek, designated beneficial uses of the aquatic ecosystems in the analysis area are not likely to be affected by any of the proposed actions. The designated beneficial use of cold water aquatic life in Box Canyon Creek would be affected by timber harvest activities, particularly new temporary road construction near the upper reaches of Box Canyon Creek. Additional mitigation measures have been added to Alternative B for the harvest units, and associated roads in the Rampart area. These measures which include field inspection and layout advice from the hydrologist, and the placement of silt control would decrease potential sedimentation. Sediment delivery from the prescribed burning activities is not expected to be major (see discussion above). At the local site there would be some increases in erosion, some areas of compaction, and small increases in water yield. However, regeneration of aspen in harvest units, and in aspen areas of the prescribed burns, would yield the soil and water values associated with aspen forests.

At the watershed scale, the level of treatment is not substantial (except Box Canyon discussed above). Alternative B makes up less than 5% of each watershed, and therefore watershed

benefits are limited and conversely impacts are limited at the watershed scale (see below for cumulative effects).

Cumulative Effects

A map analysis process was undertaken using GIS information to assess risk. The map analysis process did not model physical processes, such as sediment or water yields, but can aid in determining if such processes are likely to pass a critical threshold. Mapping included all past and proposed timber harvest activities, grazing in open meadows or parks, and all roads and trails. The East and Middle Mancos River, Upper Cherry Creek, Upper Lost Canyon, West Mancos River and the Mancos SWPA all resulted in low risk that any cumulative activity level would be surpassed.

A combination of planned harvest activities from the Chicken Creek Fuels Reduction and Forest Health Restoration Project, and the units proposed under Alternative B creates a combined potential watershed impact within the Chicken Creek watershed because the two projects are expected to occur within similar timeframes. Other cumulative actions within this watershed include the recent reduction in cross-country motorized travel, and changes from motorized to non motorized use as part of the recent Mancos/Cortez TM plan. Roadwork to implement these changes is planned to start in summer 2009. Current watershed condition is satisfactory in the headwaters and is somewhat degraded in the approximate lower 1/3rd of the watershed.

In the long term, the Chicken Creek Fuels Reduction and Forest Health Restoration Project would reduce the potential for high-severity wildland fire, while successful regeneration of the aspen units would also reduce the potential for high-severity fire. Road work would result in long-term decreases in potential sedimentation where roads or trails are hydrologically connected to streams. Additionally, the activities that result in high disturbance would be implemented at different times which allow some areas to recover prior to another high disturbance activity taking place elsewhere in the watershed. Upcoming term grazing permit renewal projects will continue to address livestock management regarding range and riparian condition and Forest Plan standards and guidelines. Considering all of the above, the Chicken Creek watershed would benefit from implementing Alternative B.

A more detailed analysis of cumulative effects in the Box Canyon watershed included estimating that 25% of the Box Canyon prescribed burn would result in high soil burn severity. A similar mapping process that included roads, trails, grazing, past harvest and Alternative B activities was performed. Given the current stream channel conditions of Box Canyon Creek and the known percentage of fine sediment in the upper reaches of the stream, there is moderate to high risk of cumulative sedimentation effects. To alleviate this risk a mitigation measure requiring the Box Canyon burn and the Rampart area harvests to be separated by at least two years was added. This along with the design features described above for sediment control would lower the risk of sedimentation. Additional road, trail and channel improvement work within the Rampart sale area was identified under the KV section of Alternative B.

3.10 Weeds

Background

The northern half of the analysis area contains about 400 acres of musk and Canada thistle, and the southern half contains about 1100 acres of these two species. The major infestations are associated with the Lucy Timber Sale area, T-Down Park, and the railroad grade along the southern boundary of the analysis area. The railroad grade area also has large infestations of houndstongue (about 130 acres), and smaller infestations of yellow toadflax and spotted knapweed (about 2 acres and 5 acres respectively). Caviness Mountain has a couple of small patches of yellow toadflax, and some larger patches of Canada thistle.

Although the infestations of yellow toadflax and spotted knapweed comprise only a small portion of the total infested area within the analysis area, they are high priority herbicide treatment areas due to their potential for rapid expansion.

Effects

Under Alternative A (No Action) weed treatments would be conducted as part of the District-wide weed program, and according to the strategies outlined in the *Invasive Species Action Plan 2007-2009*. It is likely that the high priority toadflax and knapweed locations would be treated in the near future. Locations of known musk and Canada thistle may not be treated until later, depending on the District priorities and funding.

Under Alternative B (Proposed Action) design features described below would be followed. This includes inventory and weed treatment in the areas that experience ground disturbance with a focus on landings, skid trails and roads. Some increase in the number of plants at existing locations, or increased extent of existing populations, or spread to new locations may occur under this project. However, with the design features in place, this spread is anticipated to be minor and follow up inventory and treatments would offset these effects in the long term.

Areas of musk and Canada thistle that fall within treatment units or along access roads would be treated more quickly than Alternative A.

Cumulatively, the weed program on the Dolores Public Lands includes treatment of high priority weed locations annually according to the *Invasive Species Action Plan*. These treatments may occur within the analysis area in a similar timeframe as this project, especially the high priority toadflax populations. Ongoing and planned timber sales in the analysis area have similar weed prevention and eradication measures as those described for this project.

3.11 Visual Quality

Background

Scenic values for this analysis area are described in the *Values and Existing Conditions* document and the *Landscape Architect's Specialist's Input*. Briefly, aspen forests in the analysis area add to outdoor recreation experiences in the summer, provide fall color viewing

opportunities, and scenic backdrops to major highways in the area. The San Juan Land and Resource Management Plan identifies much of the affected area as important for scenic values.

The San Juan Forest Plan set objectives for visual quality for each of the Forest Plan Management Areas. Visual Quality Objectives of "Partial Retention" and "Modification"[4]. In addition, the Forest Plan states when projects require clearing of vegetation and or soil disturbance, use irregular clearing edges and shapes to blend with the natural landscapes. Management activities would be designed to harmonize and blend with the natural setting. Uneven boundaries and leave islands have been incorporated into the design features of Alternative B (Proposed Action).

Affected Environment

Currently, the area generally meets Forest Plan direction, with Partial Retention along arterial and collector roads and trails and at developed sites. The area also generally meets Partial Retention in locations away from main traveled roads and use areas. This is the result of careful design and implementation of past vegetation treatment. Units would be designed to be natural in shape, blend with the topography, maintain uncut islands of trees and protect vegetative diversity.

The area has experienced a long history of vegetation management. Visitors experience diverse views of landscape features, including treatment areas that contribute to the areas visual interest and diversity.

In some areas, particularly recent harvest units, views of stumps, slash, marking paint, and log decks, as well as access roads are evident. Forest openings are, in some places, clearly human caused. However, the overall pattern of treatment, as well as the organic shapes of the units (cutting area boundaries), and the residual trees left uncut within the units, contribute to the impression of a predominantly natural appearing forest.

Effects of Alternative A (No Action)

Under this alternative, aspen are expected to continue to die, accompanied with slow and spotty regeneration, within the project area. This is a natural and dynamic component within this landscape. Informed visitors may notice more dead, dying and fallen aspen. The area will generally maintain the Visual Quality Level of Partial Retention throughout. After a decade it is expected that there would be less overall aspen within the area. Aspen is a species highly valued for its summer beauty and fall color. This reduction in healthy aspen throughout, and long-term reduction in acres of aspen would slightly lessen the scenic values. The area, however, would maintain its reputation as a place to view aspen.

This condition may encourage more fire prone dead stands. If fire does burn through the area, the result is likely to be extensive aspen regeneration similar to the recovery in the Missionary Ridge

[4] Partial Retention = Human activity may be evident, but must remain subordinate to the characteristic landscape and Modification = Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in the foreground or middleground.

fire area. This sort of regeneration would likely take longer than in Alternative B (Proposed Action) due to the recovery and regeneration process after fire.

Effects of Alternative B (Proposed Action)

This alternative results in some moderate enhancement of aspen scenic values. The proposed treatments would, over the next decade, enhance aspen regeneration on a portion of the project area. Visual diversity may be enhanced in some foreground views from FR 566 and FR 316, as well as from other lesser traveled forest roads. Campgrounds would not be directly affected by the proposed activity. Box Canyon Trail scenery would be potentially affected by prescribed fire in the short-term. This activity is expected to create a long-term scenic experience with visual diversity and aspen regeneration.

The area would generally maintain the visual quality objectives of Partial Retention and Modification. Design features described in Chapter 2 help maintain these objectives in the short and long-term.

Cumulatively, approximately 20 percent of the area has experienced past/current aspen treatment. This proposal would increase that by another 7 percent and continue the manual regeneration of aspen stands that has been occurring within this area for the last 20 years. This contributes to the supply of a valued landscape feature, basically converting dead and dying aspen into stands of young aspen, in a relatively short timeframe. The change would be subtle and not noticed by many people over the 5 year project time frame. Over a longer time frame (25 years), there would be a substantial difference between Alternative A and B. Alternative B would result in approximately 7 percent more area of healthy aspen, which under Alternative A would be a mix of conifer, oak and small slowly regenerating, sparse stands of aspen.

3.12 Risk of High-Severity Fire

Background

Aspen has a long fire return interval, and due to its high elevation and lush under-story of grass and forbs, it burns infrequently. The aspen cover type is however dependent on fire. Aspen is maintained by fire, sometimes high-severity fire. Aspen responds very well to fire and prolific suckering often occurs as a response to fire. Large fires have maintained fairly even-aged aspen stands throughout the west, and many of these even-aged stands can be found on the San Juan National Forest. Perpetuation of the aspen type is key to a well-functioning ecosystem and to limit the risk of high-severity wildfire.

Effects

Larger patches of young aspen would meet two key objectives. The first is that it would create more patches of vigorous aspen that is more resilient to disturbance agents such as insects and disease. The second is that larger patches of vigorous aspen help to create a "greenbelt", where fire is unlikely to burn with much intensity except under the most extreme fire conditions. The proposed harvest, mastication and prescribed burn units adjacent to the private land around the Spring Creek private property are designed to promote young aspen, and maintain this greenbelt adjacent to private homes.

3.13 Forest Roads

Background

There are no proposals to change the location, miles, maintenance levels or types of public use for the road system within the aspen analysis area. The road effects analysis is confined to the potential sale area boundaries that surround the proposed coppice clearcut and mastication units as described in Alternative B (Proposed Action), where roads are affected. Additional detail is located in the Transportation Plan in the project file, and conclusions are summarized below. Tentative sale areas are named Turkey Creek, East Rampart, Caviness Spring, Spring Creek, Morgan Gulch (Haycamp Mesa area). For the paragraphs below, a non-system road refers to any old road, old skid trail or user-created route that is not part of the authorized National Forest road system.

The Forest Service uses the following target maintenance levels for all roads; Level 4 (suitable for passenger car travel and provide comfort at moderate speeds – usually graveled), Level 3 (suitable for passenger car travel – usually graveled), Level 2 (high clearance vehicles – usually native surface), and Level 1 (closed roads – usually native surface and available for administrative use only).

Effects – Alternative A (No Action)

None of the road work described above would be conducted under Alternative A (No Action). There are no effects to the road system under Alternative A.

Effects of Alternative B (Proposed Action)

Roads to be used for Alternative B include a combination of surfaced and native surfaced roads. The table below shows the miles of anticipated maintenance, reconstruction and temporary road work for each of the sale areas under Alternative B. All miles are estimated from GIS and aerial photo interpretation and would be refined in the field during project implementation.

Various types of roadwork would occur under Alternative B. Reconstruction consists of blading, shaping and installing drainage structures as needed for access by log trucks. All roads would have during and post-haul maintenance performed by the purchaser. As described in the design features in Appendix B, any temporary road would be ripped to stimulate aspen sprouting, and would also have, non-drivable water bars constructed, seeded with native seed mix, and logs placed across. When Level 1 roads are used, drainage structures such as gravel dips may be installed and left in place prior to re-closing the road. Some Level 1 roads have re-vegetated and would do so again after use. There is no new road construction. Erosion control measures described in Appendix B, for the Box Canyon watershed would be made part of the maintenance plan for the timber sale in the Rampart area. Temporary roads may be located on existing old roads, or consist of new bladed segments (see table below). There is no roadwork necessary for the mastication unit.

Generally, less impact occurs from using temporary road than constructing new ones or increasing skidding distances. Design features for temporary roads are described in Appendix B. Once the timber-sale unit is harvested, all temporary roads used by the contractor would be obliterated by the contractor. Decommissioning would include outsloping (if possible),

constructing non-driveable waterbars, scarification of the road surface to a depth of approximately one foot, seeding of the roadbed for the entire length and width, spreading slash across the area, and removal of all culverts to restore the stream channel to approximately its original plan and profile. The non-driveable waterbars would be located according to the spacing chart in the transportation plan. None of these temporary roads would be added to the Forest Service road system.

Estimate of Road Work to Support Management Activities of Alternative B

Tentative Sale Area	Miles of Maintenance	Miles of Recon-struction	Miles of Level 1 Closed Roads (subset of maint./reconst.)	Miles of Temporary Road – new blading (segments range in size from 1/8 to 1/3)	Miles of Temporary Road on nonsystem roads (segments range from 1/8 to 1/2 mile)
Caviness Spring	7.7	1.5	1.5	0.5	0.7
Morgan Gulch	17.2	0.5	2.8	0.4	0
Turkey Creek	14.2	1.2	0	1.4	1.5
Spring Creek	12.9	0	0.8	0.4	4.2
Rampart East	9.1	2.0	2.6	1.0	0.7

Maintenance is pre-haul, during sale, post-sale or combination
Closed Roads (Level 1) would open gate, use road, then close gate after sale

The roadwork described above is feasible and would be conducted as part of the timber sales. Total road densities are expected to be similar to current conditions, with a slight net reduction in the nonsystem roads after nonsystem/temporary roads are obliterated. Any reduction in nonsystem roads contributes to other resource objectives such as erosion control, reduced habitat fragmentation and travel management. Cumulative changes in the miles of un-needed roads would occur because other projects that would occur in the same time frame within the analysis and add to the overall reduction in roads include; Ongoing Road Decommissioning Service Contract, Turkey Knolls timber sale and Upper Lost timber sale. Also cross country travel was recently prohibited in the analysis area.

The Aspen Forest Health and Restoration Project analysis area occurs entirely within the boundaries of the Mancos/Cortez Travel Management Plan (TM Plan), and this project does not change the locations, miles, types of vehicles or location of uneeded roads all previously identified in the Mancos Cortez TM Plan Decision Notice. Because this aspen project proposes no change to the road system, and serves to implement the desired road system identified in the Mancos/Dolores TM plan, a Travel Analysis Report is not required. This project complies with 36CFR212.

3.14 Rangeland Resource Related to Harvest/Mastication

Background

Coppice clearcuts have the potential to provide an increase in forage availability for cattle initially, a decrease in forage over 15-20 years, followed by an increase in forage underneath mature aspen stands. The decrease in forage occurs when aspen suckers are dense and prevent cattle from moving through the stand and accessing forage. After 15-20 years, the canopy cover would mature, and understory would become more open and accessible. An increase in palatable grasses and forbs would occur as the stand continues to mature. Mastication has similar effects as coppice clear-cut, however, the patch sizes of dense regeneration may be smaller or interspersed with areas of oak and ponderosa pine so that the entire unit is not removed from forage availability.

The paragraphs below summarize effects and additional detail is located in the Range Report in the Project File.

Effects of No Action

There would be no effects on forage availability as a result of clearcut harvest, except for the ongoing Turkey Knolls Timber Sale areas in the Spring Creek and Turkey Creek Allotments.

A continuation of tree mortality from SAD would cause trees to die and fall over, leaving a jackstrawed pattern of fallen aspen that creates barriers for cattle and wildlife until they decay. Regeneration of aspen in SAD areas is expected to occur but in a sparser or patchier manner than under Alternative B. This may increase inclusions of oak, snowberry, native bunch grasses, Kentucky bluegrass or conifers. An increase in inclusion of oak, snowberry or conifers within the aspen stands lessens forage. An increase in inclusions of native bunch grasses or Kentucky bluegrass may increase forage.

Effects of Alternative B

There are a total of ten active grazing allotments that fall within the Aspen analysis boundary. Of those ten, eight have proposed areas of treatment. Of the eight, Alternative B would have minimal effects on the current grazing operation of Haycamp, Turkey Creek, Railroad and Canyon Allotments. The percentage of pasture acres is low and/or enough exists in the grazing system to adapt to the proposed treatments. The Jersey Jim, Spring Creek and West Mancos Allotments are discussed in more detail below under cumulative effects.

For any of the allotments, debris leftover from logging operations may restrict livestock travel, making it difficult to gather livestock. The presence of down woody material occurs during the same time frame when the saplings are very dense, and the stand is less accessible to cattle. The down woody material helps protect aspen sprouts from browse. Although some logs remain after the 15-20 years, this would be a temporary inconvenience to the grazing permittee, and is not expected to change forage availability in the long-term.

Harvests, mastication and burning all have the potential to affect range structures such as fences, however, design features are part of the action alternatives that protect these structures or require their repair if damaged (see Design Features section Chapter 2 of the EA).

Actions that result in a healthy aspen overstory would improve rangeland vegetation and available forage over the long term wherever those actions occurred.

For any of the allotments, post-harvest monitoring may show cattle or elk browsing that could detract from healthy aspen regeneration. As discussed in the monitoring plan in Appendix C, post-harvest hingecuts may be placed around selected units as a deterrent to browsing in the first few years after harvest. Such actions would be brought to the attention of the range staff for grazing coordination and are not expected to change forage availability beyond the effects discussed above.

Cumulative Effects

GIS analysis was conducted to determine the number of acres harvested or burned within each pasture for Alternative B, the recently approved Turkey Knolls Timber Sale, and any other past regeneration harvests that fall within the 15 year timeframe. For cattle grazing, the effects on one allotment do not overlap with other allotments because the permittees do not hold a permit on more than one allotment in this landscape area. Each allotments grazing system is independent of the other.

Previous NEPA analysis for the Lucy Timber Sale and the Box Canyon watershed identified known problem areas and poor vegetation composition within the two pastures of the West Mancos Allotment (see also the soil and water section of this EA). A NEPA analysis for the West Mancos Allotment is currently underway, and the alternatives include changes to grazing management for improving understory conditions. Future NEPA analysis is planned for the Spring Creek, Turkey Creek and Jersey Jim allotments in 2010. In some areas, the aspen harvest and/or burning would change the way livestock graze, either by removing some of the acres available for grazing and concentrating livestock in the remainder of the allotment, or by providing highly preferential forage (especially after burning) that is easily damaged. The discussions below highlight the allotments and pastures where this occurs. The design features in Appendix B include items related to grazing coordination that would be implemented under Alternative B.

<u>Jersey Jim Allotment:</u> Design features have been added for the Upper Big and Horse pasture of the Jersey Jim allotment to coordinate the timing of harvest, mastication and grazing use. These adjustments can be absorbed by the harvest/mastication operations and the grazing operations with minor inconvenience to all three.

<u>Spring Creek Allotment:</u> Three pastures (Copinger, Spring Creek and Turkey Knolls) contain proposed coppice clearcuts. The Copinger pasture is affected the most, with a proposal of 208 acres to be treated. In addition to the proposed treatment, the past Turkey Knolls timber sale harvested 143 acres. This is a combined affected area of 351 acres, which is 41% of the pasture in terms of total acres. Turkey Knoll and Spring Creek pastures would be less impacted, 10% and 5% of proposed treatment respectively. Forage analysis associated with the upcoming range analysis scheduled in 2010 would consider this information (see Design Features in Appendix B).

West Mancos Allotment: Coppice clearcut proposals would have minimal effects on forage availability and cattle grazing operations for the West Mancos Allotment. Both of the proposed landscape burns occur in this allotment and are discussed in more detail in the Range/Prescribe Burn section below.

3.15 Rangeland Resources Related to Landscape Prescribed Burns

Background

Landscape prescribed burning, and any post harvest burn treatments would create a need for short-term changes in grazing schedules to provide rest after burning. There is also the potential for long-term improvement in available forage and cattle distribution.

Effects of Alternative A (No Action)

In the Box Canyon and Rampart Hill areas, taking no action for prescribed burning would result in an overall reduction in the amount of aspen cover type in these pastures. Some sprouting is expected, but aspen patches may be smaller and more tied to swales or small drainages and less apparent in the flatter areas. Snowberry patches are expected to remain in the Rampart Area. Other forest types, such as Gambel Oak, ponderosa pine and Douglas Fir would remain unchanged. As discussed in the soil and water section of this chapter, loss of aspen overstory increases evapotranspiration rates, which could exacerbate the relatively dry growing conditions that already exist. There is no impact to grazing operations related to resting pastures related to burning.

Effects of Alternative B (Proposed Action)

There are two pastures proposed for landscape prescribed burns on the West Mancos Allotment, T-Down and Box canyon. Prescribed burns are expected to create long-term increase in grass/forb production and short term impacts on cattle grazing operations. There is a mix of vegetation in the proposed burn areas and a mosaic of fire intensity and distribution is expected. Patches of aspen may regenerate with similar short and long-term forage effects as the coppice clearcut harvests. Forest understories, underneath mature pine, Douglas-Fir and Gambel oak may thin out creating more growing space for forbs and grasses. Grassy openings should respond with a flush of new growth. Native bunch grasses may improve their size and distribution. Livestock distribution is expected to improve with the increased amount of available forage.

Prescribed burning includes design features to coordinate pasture rotation schedules in order to allow deferment and/or rest after the burns (see Appendix B). Moving cattle from one allotment to another creates a short term negative affect to cattle operations in terms of costs associated with trucking. However, the prescribed fire provides an opportunity for long term improvement in cattle distribution and available forage. Densely vegetated slopes are likely to open up in a mosaic pattern and increase palatable grasses and forbs. Maintaining aspen overstories can provide shade and protection from drying of grasses and forbs.

3.16 Commercial Wood Product Opportunity

Aspen timber harvest on the Mancos/Dolores District has a long history here, and has been a part of the local economy since the 1960's. Presently there are two local aspen mills in Montezuma county. The excelsior plant in Mancos utilizes most of our aspen and has recently bought a couple of SAD sales offered by the District. Their product is mostly erosion control matting and cooler insulation. Both products utlilize a 16" aspen piece which is shredded and woven into a mat to use for their product. The Aspen Wall Wood plant out of Dolores produces an aspen tongue and groove paneling, used mostly for interior walls and ceilings. This mill has also purchased a few of recent Forest Service sales, and will buy some of the better quality wood. In addition to these 2 local mills, there are a few aspen furniture cottage industries, and a local demand for aspen firewood. This proposal would also serve their needs with some road-side hazard tree clearing, and a few stands of small diameter aspen for furniture.

Timber volumes are described in ccf. 1 ccf = 100 cubic feet. The annual sell target is about 24,000 ccf for the Forest, and the Mancos/Dolores District produces about half of that or 12,000 ccf. In the past few years half the District target or 6,000 ccf has been aspen and the other half has been ponderosa pine. This analysis and proposed 1550 ac of clear-cut harvest should provide enough aspen to the local industry for the next 3 years. This harvest treatment is designed to offer about 500 ac/year over 3 years while there is some merchantable value for this dead and dying aspen. It is fortunate to have 2 local aspen mills adjacent to the analysis area with the capability to utilize aspen, and help regenerate these stands.

3.17 Economics

Background

Items generally associated with economic and social aspects of a vegetation management project include effects on timber-related employment, government payments to Counties with money generated from timber harvest receipts, and whether or not the revenues of a timber sale exceed the costs of selling that timber (see Economic Report for detailed discussion) Analysis of economic and social environments is a complex subject that is generally analyzed at a broader scale than an individual timber sale or vegetation management project. The second Purpose and Need in the E.A. (pg.4) states the importance of the local economy as it relates to this project: "**Local economy:** " There is a need to support the local economy and its dependence on timber, grazing and recreation in the aspen forests."

Discussions with local Aspen purchasers have indicated a continued interest in Aspen sales in the Montezuma and Dolores County areas. Three SAD aspen timber sales have recently been sold, which indicates that medium to large size sales in this project area will be economically feasible for an operator to purchase and harvest without supplemental Forest Service funding.

In order to assess the short-term financial efficiency of the planned project, basic harvest volumes and value are projected for this proposal, along with an estimate of associated costs to plan and implement. The Haycamp Point, Oak Knolls 2 and Turkey Knolls aspen timber sales, along with recent stand exam data from the proposed harvest units, were used to estimate the volume of the timber.

Timber Volume: 20 ccf/acre x 1,500 acres = 30,000 ccf of Aspen

Revenue:	Aspen Stumpage -	30,000 x $18.00/ccf	= $ 540,000
	Surface Rock Collection	30,000 x $ 3.20/ccf	= $ 96,000
	Total Project Revenue -		= **$ 636,000**
	Revenue/ccf = $636,000/ 30,000 ccf =$21.20/ccf		

Forest Service Costs:
These costs are estimates of the direct financial costs to the Forest Service.

NEPA Analysis and Planning	- $ 6.00/ccf x 30,000 ccf	= $ 180,000
Sale Preparation	- $ 7.00/ccf x 30,000 ccf	= $ 210,000
Sale Administration	- $ 3.50/ccf x 30,000 ccf	= $ 105,000
Effectiveness monitoring	- $ 15.00/acre x 1,500 acres	= $ 22,500
Total Forest Service Costs		= **$ 517,500**
	Totalcost/ccf= $517,000/30,000 ccf = $17.25 $/ccf	

Based on the above estimates the net financial value of this project is positive at 1.23. In addition to a positive net value, consideration of the proposal should include its planned contribution to Forest Plan goals and objectives, forest health and jobs and tax revenue to the local economy. This proposal represents a reasonably cost efficient means of achieving these objectives and providing positive public benefits.

Effects of Alternative B (Proposed Action)

The following assumptions were used to evaluate economic effects of the action alternatives. Estimated volumes are shown in the attached table, and total estimated volume is 30,000 ccf. Prices per ccf for each forest product were derived from the most recent (3/21/09) Transaction Evidence Base Values for Region 2. The revenue generated calculation takes into account road maintenance and temporary road construction. The Revenue before costs is expected to be $636,000.

Direct and indirect costs include expenses from timber sale preparation, timber harvest administration, silvicultural stand examination, resource specialist project support, and the implementation of established transportation plans. The calculation for the direct and indirect costs was obtained from the last 3 aspen sales on the District and associated costs. This figure is $17.25 per ccf of timber harvested.

Comparison of Economic Effects

Economic Measurement Indicators	Alternative A (No Action)	Alternative B
Revenues	0	636,000
Costs	180,000 (planning)	517,500
Benefit to Cost Ratio	negative	1.23

A variety of forest products, as well as early seral wildlife habitat would also be maintained, particularly from treating and maintaining aspen stands. Providing forest products, sustaining timber-related jobs, and maintaining healthy aspen on the landscape would provide a positive effects on the local area.

Effects of Alternative A (No Action)

The No Action alternative would result in no harvest activities, and only costs for planning are incurred along with no revenues. There would be no timber sale receipts generated (K-V funds). No associated costs or benefits from road construction, reconstruction, or maintenance would occur either. Timber harvest and the resulting social/economic benefits lost would have to be obtained elsewhere on the forest, or the 25% and payments to the county would be reduced. The number of jobs created or sustained, and the associated income tax generated from National Forest management activities in Montezuma County is also likely to be reduced. The quantity and quality of timber within the project area would not be improved, and future timber value would be reduced.

Environmental Justice

Under Executive Order 12898 "Environmental Justice", federal agencies must review proposed actions to ensure they do not result in disproportionately high and adverse environmental, health, or safety effects on minority or low income populations. Observations during plant visits indicate that many of the workers were from minority populations as described in the Executive Order. As described in the economic section above, persons employed by the local timber industry have the potential to be affected by the No Action alternative because of a decreased source of wood product over the next 3 years. However, there are many factors that influence the operations of the mills, and this project is not their only source of wood. Therefore, a disproportionate effect on or changes to the area's low-income or minority communities are not expected as a result of this project.

3.18 Irreversible or Irretrievable Commitment

An irreversible commitment of resources is defined as the loss of future options. It applies primarily to non-renewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity. There are no irreversible commitments of resources for this project.

Irretrievable commitments are those lost for a period of time. For Alternative A (No Action), some raw wood fiber would become un-merchatable. In addition, 25% of the aspen stands identified for treatment are unlikely to regenerate to aspen under the No Action Alternative and would convert to other forest types, primarily pine/oak. As the root system dies, future disturbances such as fire, or windthrow, would not result in aspen regeneration unless climate and seed crops aligned to create conditions for successful seed regeneration, which is very rare. Soil structure and function remains intact and other forest types continue to provide resource benefits, albeit different ones. For Alternative B, stands proposed for harvest are expected to fully regenerate or would become forested through planting. There is no new road construction in Alternative B.

Chapter 4 – Public Involvement and Collaboration

This chapter provides a chronology of internal and external input that took place for this project. The chapter is divided into the planning phases of 1) Developing Proposals 2) Scoping 3) Developing Alternatives and 4) Consultation. This section also includes the references for the EA.

Developing Proposals

The interdisciplinary team convened for this project included specialists for archaeology, soil and water quality, ecology, fuels, fire management, silviculture, wildlife, range resources, engineering, recreation and scenery management. After the 2008 summer inventory data was compiled, maps were created and a summary of current conditions and photos was developed (powerpoint). In October, 2008 the powerpoint was shown to the interdisciplinary team members along with preliminary proposals for treatments. Later that month, the Rotary Club of Dolores invited the timber staff officer to speak at their monthly breakfast meeting about Sudden Aspen Decline. Also in October, staff from Colorado Wild and San Juan Citizen's Alliance visited the office. At this meeting, the powerpoint of inventory findings was shown and discussed, along with maps of preliminary proposed treatment areas. Discussions included ideas for monitoring and project design including incorporating information from other Forest's projects, steps to keep temporary roads temporary, visual quality design features, and incorporating the Mancos/Dolores TM Plan. In addition, ideas to consider for the NEPA analysis were shared, such as looking at combined effects on watersheds, and overlapping DOW defined elk concentration areas with proposed treatments. Also in October, the Forest Supervisor issued a determination of epidemic for the analysis area, based on a June, 2008 report by the Gunnison Service Center Group. A letter was also sent to the Regional Forester describing openings created by coppice clearcut that would be greater than 40 acres. In November, the owner of Western Excelsior met with Dolores Public Lands Office staff at the office and the inventory findings and preliminary maps were reviewed and discussed. This meeting included discussions about increasing the operating season to increase options for leaf off harvest. Industry re-iterated the need for a supply of wood product to local mills, and discussed how SAD affected aspen are generally useable despite insect and disease agents, especially if sales included a mix of green trees. Subsets from the ID team visited the proposed landscape burn units to verify the need for fire in these areas. Based on ID team deliberations and input during this pre-proposal phase of the project, a final set of proposed treatment units was developed and documented in a Scoping Package.

Scoping, Issues and Alternative Refinement

On January 12, 2009, a letter was mailed to inform citizens that the scoping package with detailed descriptions of proposed treatments was available for review. The letter informed recipients that the scoping package could be mailed upon request, viewed online at the San Juan forest website, or picked up at the Dolores Public Lands Office, or a copy could be e-mailed. Two mailing lists were created, one was landowners with private inholdings within the analysis area, and the other list was comprised of attendees of previous aspen workshops, range permittees, outfitters and guides, county commissioners, and local organizations interested in forest management. The letter also informed recipients of an open house scheduled for January

22, 2009 at the Dolores Public Lands Office where attendees could review larger scale maps and ask questions about the proposals. A public service announcement was released to various media outlets including newspapers and radio stations, announcing the availability of the scoping package and requesting comments. In addition, the Durango Herald printed an article with pictures about Sudden Aspen Decline that included an announcement of the date, time and location of the open house. The open house ran from 3 to 7pm, and was not widely attended. Three people attended but included the owner of Aspen Wallwood who discussed the project in detail with timber staff. Also attending were range permittees that use the Railroad Allotment in the project area. Discussions included drawing on maps.

A summary of public input received during scoping is located in the project file. Ten comment letters/e-mails/phone calls were received. Below is a brief summary of the comments. The complete comment letters are located in the project file. None of the comments resulted in a major issue or new alternative.

> Topic: Disagree with proposed coppice clearcuts, clones are showing signs of regeneration on their own, past cutting has decreased diversity i.e. more like thickets, suggest removing dead trees only. It makes no sense to kill trees that have survived the drought. Forest has already thinned itself.
> *Response: See Chapter 3, Vegetation section. It is true that past regeneration harvests have increased the 'thicket' appearance over the area. However, historical disturbances such as large wildfire or blowdowns may have occurred at even larger patch sizes than seen on the landscape today. Features that breakup the homogeneity of the landscape include reserve clumps, snags, and individual or groups of conifers. See the Visual Quality section of Chapter 3. It is also true that some regeneration is occurring in SAD affected stands already, however, it is not clear that the level of regeneration will be enough to maintain a future aspen stand. Sprouting from aspen roots occurs when live trees die, sending a message to the root system to send up new sprouts. Cutting dead trees would not cause sprouting. Aspen is a pioneer species that requires open areas with sunlight warming the soil to regenerate. Thinned aspen stands may still have too much canopy cover creating too much shade for long term maintenance of a new aspen stand. See the Vegetation section of Chapter 3. The No-Action alternative responds to these comments and is compared with the action alternative in the various sections of Chapter 3.*
>
> Topic: Roads adjacent to FR386 in vicinity of Millwood Acres should be closed.
> *Response: Per the recent Mancos/Dolores TM plan decision, roads off of FR386 near private land are not open for travel. This project does not change public use of roads. There may be a temporary road in this area that will be obliterated after use.*
>
> Topic: FR327 thru private land should be shown as closed not open
> *Response: This was a mapping error, per the Mancos TM plan the segment of FR327 on private land is closed to public use.*
>
> Topic: Range - There should be no change in permitted cattle numbers,

Response: This project does not affect range permits. See the Range section of Chapter 3 for coordination with allotment management that is necessary after the landscape burns.

Topic: Range - aspen clearcuts take areas out of range production. Slash and down logs are too abundant. Treat noxious weeds and keep gate on FR316A closed or put in a cattleguard.
Response: It is recognized that aspen regeneration can limit cattle use of forage for a 15+ years until they start to self-thin. It is also recognized that slash and down logs in clearcuts are dense until they breakdown, but logs also help protect young aspen sprouts. See the Range section of Chapter 3. Design features include keeping range gates closed see Appendix B. See the Weeds section of Chapter 3 for discussion of inventory and treatment. The location of toadflax provided by this commenter was forwarded to the District weed coordinator.

Topic: Roads - Don't use project as excuse to close or decommission roads.
Response: *There are no changes to the Forest Service road system or proposed by this project and any decommissioning or closure work would be in keeping with the Mancos/Cortez TM plan.*

Topic: Watershed - Don't impact water quality of Mancos Watershed, consider location of Mesa Verde intake, consider cumulative effects from this and past project harvest projects in all watersheds, types of soils, slopes and compaction from past projects.
Preliminary review of soil and water effects did not result in a major issue for this topic. See the Watershed Section of Chapter 3 for more information. No sizeable effects to the Mancos Watershed or the intakes were identified. Additional design features were added in the Box Canyon watershed.

Purple Martin: Protect purple martin colonies.
Response: Project design includes protecting known colonies; the martin sightings provided by this commenter were reviewed by the wildlife biologist. See the Design Features in Appendix B.

Topic: Monitoring – incorporate information from other Forests such at the GMUG.
Response: Added as a line item in Monitoring Report (Appendix C).

Topic: Roadside clearing – concerned that healthy trees may be cut if not properly administered.
Response: Clearing would not entail a swath of trees in most cases. Rather those large, fading trees that could fall into the roadway in the near future would be cut. Permits would include conditions describing trees to fell.

Topic: Temporary Roads – identify roads for complete obliteration i.e. make sure not used after the sale is closed.
Response: Additional detail about the estimated miles and segment length of temporary roads is described in the Roads section of Chapter 3. Additional techniques were added

to the Design Features in Appendix B. Temporary roads should be returned to the landscape successfully.

Topic: Root Ripping – concern about sedimentation to wetlands from root ripping
Response: The project description was refined to include measures to prevent undesirable levels of sedimentation to wetlands. This activity would be attempted at a very small scale with follow up monitoring. See Design Features and Monitoring Plan.

Topic: Browse – concern that elk, deer and cattle may browse aspen sprouts thus limiting the success of regeneration, suggest mitigations measures that include sufficient funds for fencing or other measures.
Response: The potential for browse levels that might limit regeneration success is limited to a few areas of the project and not all units. However, monitoring includes taking note of browse on sprouts beginning with the first year survey. See Monitoring Plan Appendix C. Hinge cutting is listed as an adaptive management technique to use in selected areas if needed.

Topic: Burn intensity in mowing areas – concern that chip layer may burn too hot, included reference article.
Response: Review of potential burn intensities did not result in a major issue or alternative. The article provided was reviewed by the fuels forester. Mastication is proposed only in the one part of the project area, adjacent to private land, and chip layers are expected to have varying depths because of the variety of aspen, pine and oak in the stands. Burn objectives include a cool burn. See the Vegetation section of Chapter 3.

Additional meetings were held upon request with interested parties as the Environmental Assessment was being developed. These included two meetings with representatives of the Mancos Watershed group who volunteered to be involved in project monitoring (see Monitoring Plan Appendix C). Another meeting with representative from Colorado Wild was held to share the draft Monitoring Plan. A professor from the Fort Lewis College Biology Department, and two senior students, expressed interest in monitoring within SAD areas within the project area. One student met with members of the ID team (Monitoring Plan Appendix C).

Consultation

Consultation occurred with Native American Tribes through a letter and information package sent to tribal representatives on March 10, 2009. No concerns were identified during this consultation process. Should any new sites be discovered during implementation that information would shared with tribes by the District archaeologist.

A copy of the cultural resources report was sent to the State Historic Preservation Officer who concurred with the findings with the condition that any aspenglyphs discovered during implementation would be evaluated, recorded and if necessary protected.

A copy of the scoping package was shared with Colorado Department of Wildlife staff and no concerns were raised. Consultation with US Fish and Wildlife Service was not required, see Wildlife section of Chapter 3 for effects to Canada Lynx.

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Appendix A – Alternative Maps

Appendix B – Design Features

The following design features would be implemented under Alternative B.

Vegetation – Prescriptions

1. Viable small-diameter sapling and pole size aspen (<5" DBH) found in clumps will be protected and left on site. These clumps should be retained to provide size class diversity and residual stocking across an otherwise clearcut area. Damaged small diameter conifer and aspen(<5”->2” Dbh) will be slashed by the purchaser.

2. Wildlife/Visual or Sapling size clumps will be left in or adjacent to the clear-cut harvest units and comprise 10-15% of the unit acres. These reserve clumps will function as snag and wildlife habitat, contain conifer that is undesirable to aspen harvest or serve as a visual screen to breakup clear-cut appearance near well traveled forest roads.
    a. Wildlife reserve clumps should be a group of live and/or dead trees, aspen or conifer, a minimum ½ acre is size but larger groups of 2-5 acres are recommended. Favor i) live and/or dead large diameter (>15”) aspen or conifer with evidence of cavities, rot, broken tops, dead tops or lightning strikes, and ii) a basal area of 100 or greater. Locate clumps strategically to take advantage of existing conifer pockets, or pockets of large aspen trees, small-scale boggy areas or rocky soil, otherwise distribute evenly.
    b. Visual reserve clumps – see visual quality below.
    c. Sapling clumps – see #1. above.
    d. Clumps of trees at entrance of temporary roads from main roads (where they occur) to screen and prevent travel on the temporary road.

3. Douglas Fir and Ponderosa pine will be retained for residual stocking in aspen clear-cut units as regeneration is more questionable in lower elevation SAD stands. Conifer at higher elevations (Engelmann Spruce, Blue Spruce and Subalpine fir) may be harvested on an individual unit basis if regeneration looks promising and conifer volume is adequate.

4. Slash from the tops of the trees and rotten log segments may be left in the harvest units in a random fashion, and lopped to within 2 feet of the ground. The objective is to leave 15-20 tons per acre of slash in order to provide nutrient cycling, habitat for wildlife, and soil protection. Whole tree skidding will be allowed if the slash objective can be met.

5. The mastication cutting in aspen should leave 2-3 snags/acre 12 inches DBH and greater and taller than 15 feet. Snags may be left as individuals or in clumps. Also, avoid cutting patches of healthy aspen regeneration.

6. To insure optimal regeneration in harvest units and limit the amount of browse from cattle, range conservationists on the District will be informed on progress of harvest on aspen sales. This information will be shared with the cattle permitee’s on various allotments that have recent aspen harvest. Permittee’s will be requested to herd cattle

7. If a browse concern is identified during monitoring, in clearcut harvest or mastication units, hinge-cut trees to create barriers around the perimeter.

8. In units 7, 10 and 82 of the Turkey Cr sale area bordering the Turkey Cr subdivision, locate and reserve clumps of live aspen, saplings or conifer that would screen these private homes from FSR roads 385 and 386. Also obliterate all unnecessary roads that might encourage cross country access to these homes through forest lands.

Vegetation – Timing of Harvest

1. Normal Operating season for these SAD aspen sales will be June 10 thru Nov 15th. On units with a majority of dead, units may be required to be logged during a fall season (leaf off) of 9/15 thru 11/15 to promote aspen suckering during a leaf off time period. These units will not be more than 25% of the sale acres.

2. On harvest units accessed by the West Mancos Rd (FSR 561) and the Echo Basin Rd (FSR 566) , to prevent conflicts with winter recreation on groomed snow trails there will be no logging operations permitted from December 15th to April 15th.Winter snow plowing to facilitate logging operations would conflict with these uses. In other areas that do not have high winter recreation usage, winter logging should be an option, as sprouting following winter harvest may be more successful.

3. A few timber-sale units border or surround the Morrison trail, a popular ATV route in the Spring Creek area. During logging operations on these units, the trail will be posted closed for public safety reasons, and a re-route sign to divert traffic along roads will be posted by the Forest Service . The Timber Sale Administrator will inform the District recreation staff on purchasers operating plan and timing for those units affected. Portions of the Morrison trail that lie in the harvest unit will not be used as skid trails (protected improvement) and skid trails across this trail will be limited and approved by the TSA. Slash located on the Morrison trail will be removed and trail will be left as it was found by the purchaser. Trail will be re-opened upon completion of logging operations. A closure order for this trail will be filed at the Dolores Public Lands Office.

Vegetation – Landings, Skid Trails, Temporary Roads and Forest Roads

1. Minimize the size of landings because they tend not to readily regenerate by sprouting. Rip landings to a depth of 6-8 inches, following use to encourage coppice regeneration and reduce compaction. Slash on landings is to be lopped and scattered to within 2 feet of the ground, and residual debris volume should range from 15 to 20 tons per acre. The overall objective will be that 40-50% of the landing area has exposed mineral soil, or that on 40-50% of the landing, slash does not block sunlight from reaching the ground surface. Pile landing slash or redistribute back into the harvest unit if necessary to meet this objective.

2. Location of skid trails shall be agreed upon by the Forest Service prior to their use.

3. Existing, nonsystem roads, located in or adjacent to harvest units would be used as temporary access roads to facilitate harvest of timber, where long skidding distances would otherwise cause unnecessary resource impacts. Normal average skidding distances of 400-800 feet can be expected and longer distances usually require some use of temporary roads. Temporary roads are estimated at 6-9 miles, ranging in length from 1/8 to1/2 miles will be used.

4. Where no roads and long skid distances exist, new temporary roads are needed for an estimated 2-3 miles, ranging in length from 1/8 to 1/3 mile.

5. All temporary roads used by the contractor would be decommissioned following harvest. Decommissioning would include outsloping (if possible), constructing non-driveable waterbars, scarification of the road surface to a depth of approximately one foot, seeding of the roadbed for the entire length and width with the seed mix listed below, and removal of all culverts to restore the stream channel to approximately its original plan and profile. The non-driveable waterbars shall be located according to the spacing chart in the transportation plan. None of these temporary roads will be added to the Forest Service road system

6. Final determination of need, location and length of temporary roads is requested by the timber-sale contractor, and approved by the Forest Service Timber Sale Administrator.

Vegetation - Seeding

1. Temporary roads, landings, skid trails, firelines and any ground disturbance over 15' in diameter should be seeded with one of the mixes below. Rates reflect broadcast seeding; they should be halved if drill seeded. If some species are not available or are cost-prohibitive at the time of purchase, contact the Ecologist for substitutions. Each mix should cost approximately $210/ac at the broadcast rate.

Pure Aspen Mix

Common Name	Scientific Name	Variety	Rate (PLS lbs/ac)
Arizona fescue	*Festuca arizonica*	Redundo	0.7
Nodding brome	*Bromopsis anomalus*	VNS	4.0
American vetch	*Vicia americana*	VNS	1.0
Blue wildrye	*Elymus glaucus*	Elkton	7.2
Canada wildrye	*Elymus canadensis*	VNS	4.2

- if American Vetch is not available at time of order, remove from mix
-

Lower Elevation Aspen Mix

Common Name	Scientific Name	Variety	Rate (PLS lbs/ac)
Slender wheatgrass	*Elymus trachycaulus*	San Luis	3.5
Arizona fescue	*Festuca arizonica*	Redondo	1.3
Muttongrass	*Poa fendleriana*	VNS	0.5
Western wheatgrass	*Pascopyrum smithii*	Arriba	3.2
Tufted hairgrass	*Deschampsia caespitosa*	VNS	0.1

Common Name	Scientific Name	Variety	Rate (PLS lbs/ac)
Thickspike wheatgrass	*Elytrigia dasystachyum*	Critana	2.2
Junegrass	*Koelaria macrantha*	VNS	0.2
Nodding brome	*Bromopsis anomalus*	VNS	3.9

VNS = variety not specified, ask for the most local variety

Wildlife

1. Goshawk surveys will be conducted prior to any treatments in the analysis area.
2. If an active goshawk nest is found during layout, a ¼ mile no-activity (mechanical treatment) buffer will be placed around the nest site from March 1 – August 15, and a 30 acre no-cut buffer will be also placed around the nest. If active nest is found post sale award, wildlife biologist will be notified, nest will be surveyed and proper mitigation will be determined.
3. No aerial burn ignition near active goshawk nests during the nesting period (March 1 – August 31).
4. Burn personnel should consult with wildlife personnel prior to burning through active goshawk nest stands. Goshawks can be aggressive and attack humans during certain periods of nesting. Biologists will notify burn personnel when that threat is high.
5. Personnel involved in timber marking and burning should be trained in raptor nest identification. This will allow project personnel to become familiar with raptors and to conduct nest searches during burn project layout activities.
6. Leave a 150 foot mature aspen buffer between cutting unit, and meadows that contain purple martin nesting colonies
7. Surveys for purple martins will be conducted in analysis area prior to any treatment of units that border meadows and ponds. If nests are found outside of the 50 m buffered area, the buffered area will need to be extended to include the nest trees.
8. To retain potential habitat for the Northern Leopard Frog, buffer wetlands a distance equal to 2 times the maximum diameter of the wetland up to 150 feet.

Cultural Resources

1. Any ‘Eligible’ or ‘Need Data’ sites within the project area would be avoided by project activities.
2. Sites containing structures, wooden features, or other sensitive sites would be protected from prescribed fire by the use of hand lines or other appropriate methods.
3. If any additional cultural resources are discovered during project activities, activity at that location would cease and the District Archaeologist would be notified. The discovery would then be recorded and assessed, and the appropriate mitigations and consultations would be completed. The decision on whether to continue implementation at that location would be based on this assessment and consultation.
4. During Marking and Cruising of the clearcut harvest units, layout of the mastication unit or pre-monitoring of the landscape burn areas, notify the District archaeologist if any historical (50+ year old) arborglyphs are found. The District archaeologist will determine if the glyph is of historical interest and if so record the site and the trees will be protected from harvest activities.

5. Newly constructed temporary road segments that lie outside the harvest units will require cultural clearance before construction.

Air Resources

1. Prescribed burning would require preparation of a written Burn Plan and a Smoke Management Plan that complies with State and Montezuma County Air Quality Management District standards, notification of counties prior to burning, and monitoring of smoke production.
2. Burning would be conducted under wind/weather conditions designed to rapidly disperse smoke and minimize drift into populated areas.

Public Health/Safety

1. Safety signing and other warning measures will be required during logging operations to protect the public and administrative personnel and to prevent accidents. Purchasers are required to follow all traffic laws and can be issued citations if they do not.
2. During burning, unauthorized personnel would not be allowed to access the area.
3. Prior to prescribed burning:
    a. A burn plan would be created by the Fire Management Officer at the DPLO.
    b. A smoke permit would be obtained from the State of Colorado.
    c. Firebreaks, either natural (creeks) or man-made (roads, line) would surround the burn units to keep the prescribed fire contained.
    d. Fire Managers would monitor field conditions until the area is within a specific prescription for burning.
    e. Fire Managers would ensure that available resources would be on scene to manage the prescribed burn safely and patrol the burn as long as necessary.
    f. Inform public in local communities of potential for smoke

Rangeland Resources

1. **Spring Creek Allotment – Coppinger Pasture – Cut Units Spring Creek E.A Unit 83, 37, 77, 15, 20 and 23.** During the upcoming analysis for the North Mancos Range Allotments consider the forage condition and availability in the Coppinger Pasture where 41% of the pasture will receive regeneration harvest under this project and the Turkey Knolls project. Consider opportunities to use alternative allotments if necessary during all or part of the time Coppinger Pasture would normally be grazed.

2. **Jersey Jim Allotment - Upper Big Pasture - Cut Units Turkey Creek Units MB1, U1 and U3**. This is a spring use pasture and is used for approximately 10 days. Treat these units (clearcut or mastication) after June 10 (actual date must be coordinated with the rangeland management specialist).

3. **West Mancos Allotment – Box Canyon pasture – Box Canyon Prescribed Burn Unit** In the West Mancos Allotment, on the year when Box Canyon Pasture is grazed early in the season (every other year), the fire manager should evaluate burning conditions and upon approval from the Manager, Dolores Public Lands Office, conduct fall burn if weather, burn conditions etc. are acceptable. The following spring, this information should be discussed with the term grazing administrator prior to the permittee meeting.

4. **West Mancos Allotment – T-Down pasture – Rampart Prescribe Burn Unit;** After the Rampart Hills burn, switch pastures so that T-Down pasture is grazed last in the rotation for two years following the prescribed burn. Cattle use in the burn area is not expected to be heavy because of the location of this burn area relative to water sources so complete rest is not required.

5. **Jersey Jim – Horse Pasture – Cut Units Spring Creek E.A. Unit 80.** This pasture is grazed season-long with horses needed for the cattle operation. The permittee will need to re-locate the permitted horses. Coordination with the Rangeland Management Specialist and grazing permittee before and during treatment is especially important.

6. Do not place salt in recently regenerated aspen units because salt may cause cattle to congregate, browse and trample aspen sprouts. Avoid salt in or adjacent to these areas for 5 years after harvest.

7. Loggers will be required to keep fences in good repair during operations. Wherever possible, the purchaser should use existing gates for access to cutting areas. No fences are to be cut unless absolutely necessary and agreed to in writing by the timber sale administrator. In most cases where fences lie within cutting units, design skidding patterns to be parallel to fence lines, to pull timber away from fences, or to go through existing gates. In the event temporary roads and skid trails are needed to cross fences at other than existing gate locations, these breach points must be double H-braced on each side of the cut and closed with wire or a metal gate. Any fences damaged by loggers will be the responsibility of the timber purchaser to repair immediately.

8. Pasture gates will remain closed when cattle are in or adjacent to affected pastures. The timber sale administrator will coordinate with the Rangeland Management Specialist on rotation schedules.

9. Protect range structures through lighting procedures, or fire line.

Noxious Weeds

1. When units are identified on the ground during layout, overlay those mapped units with known weed locations in GIS. Conduct pre-harvest or pre-burn inventory in selected areas. In addition, presale and fire personnel would be trained in noxious weed identification and would document all sightings of weed establishment.

2. Based on the type of weeds identified, weed treatments may be conducted by the District weed crew prior to harvest or burning. This would likely be for small populations of high priority species with a high potential for spread.

3. After the timber sale closes, use KV funds to inventory and treat noxious weed located within the sale area (either inside cutting units, along roads, or anywhere in the sale area). Some weeds may be treated multiple times as directed by the weed coordinator. Weeds may be treated for up to five years after the close of the sale. When visiting the sale area, the weed crew would monitor known populations and the effects of treatment.

4. After the landscape burns, the weed crew would inventory and treat weeds as funds allow for 1-3 years following the burn.

5. Hydro-axes or mastication equipment will be cleaned at an offsite location prior to entering the project area. Logging equipment will be subject to contract clauses for equipment cleaning. Pickup trucks and passenger vehicles are not subject to this requirement. If mastication equipment is removed from the project area, it will again be cleaned at an offsite location prior to re-entering the project area.

Visual Quality

1. All treatment units are designed to have irregular clearing edges and shapes to blend with the natural landscapes.

2. When locating leave clumps for wildlife habitat, also consider their location related to visual quality and strive to minimize the visible scale of the clearcut units. Treatment units should have sufficiently large clumps of residual trees or shrubs located within the treatment unit to reduce the apparent visual scale of the overall unit and achieve a more natural and attractive appearance in the short and long-term.

3. In addition to leave clumps in the interior, foreground views from main arterial and collector roads and system trails, and from recreation areas, should be designed with sufficient groups of residual trees and uncut islands in a manner that avoids unattractive views of large, continuous openings. This will reduce apparent size of unit, provide visual diversity, and achieve a more natural-appearing treatment area (see list of units below)

4. Within 66 feet of recreation sites such as campgrounds, picnic areas, and trailheads, slash if chipped, should be substantially disposed of unless used as mulch, mud control or path/pad surfacing; stumps should be low cut or flush-ground; slash should be substantially reduced; and treatment units should be designed to enhance scenic qualities within the viewshed.

5. Fire control lines should be restored to a natural appearance in areas within view of main collector roads and system trails. Work should be accomplished within 3 years of completion of burn.

6. Temporary slash or chip piles, log decks, or landings should be avoided within the immediate foreground of main arterial and collector roads, system trails and developed recreation sites. The immediate foreground varies by terrain and vegetation. Oftentimes

7. Limit amount of paint and flagging on boundary trees visible from main roads, system trails and developed recreation sites. When landscape architects are available, seek their input during layout and marking of units in visually sensitive areas.

Treatment Unit	**VQO**	**Notes specific to units.**
Haycamp Area		
3	PR	Foreground of FR 566; design with visual diversity, incorporate vista creation if possible.
22	PR	Foreground of FR 566; design for visual diversity.
47	PR	Blend visually with adjacent stands.
49	PR	Blend visually with adjacent stands.
Spring Creek Area		
62	Mod	Design to meet long-term Partial Retention as viewed from the adjacent system trail.
52	Mod	Design unit to avoid the appearance of a straight line at the private land boundary.
41	Mod	Design unit to avoid the appearance of a straight line at the private land boundary.
20	Mod	Design unit to avoid the appearance of a straight line at the private land boundary.
Caviness		
4	PR	Design to blend with adjacent areas, create vista if feasible, enhance visual diversity.
39	PR	Design to blend with adjacent areas, create vista if feasible, enhance visual diversity.
36	PR	Design to blend with adjacent areas, create vista if feasible, enhance visual diversity.
Rampart		
18	Mod	Design to meet long-term Partial Retention as viewed from the adjacent Road. Design to blend with adjacent areas, create vista if feasible, enhance visual diversity.

Soil and Water – Box Canyon Watershed

1. Box Canyon Watershed: Prescribed Burning - Box Canyon Watershed: Prescribed Burning - In an attempt to keep the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of the Box Canyon Watershed, and to keep percent disturbance of the watershed at a reasonable level, prescribed burning should occur no sooner than 2 years after sale closes or 2 years prior to sale award. Only hand lines and existing authorized roads and trails will be available as control lines. Hand lines will be reclaimed according to item 9 below. Lighting techniques will place fire above the two draws so fire backs into them. It is understood that these burns need to occur when burn plan prescriptions can be met, likely during late

2. Box Canyon Watershed: (Rampart T.S.) - Timber Harvest – The District Hydrologist will conduct field reviews during layout and at that time, the District hydrologist will recommend the location of silt fences or erosion control waddles along Forest Service roads. The cost of these erosion control items will be figured into the Timber Sale appraisal. Tentative locations of possible temporary roads will be discussed. After the sale is sold, and during the course of the timber sale, if/when the contractor requests a temporary road or the Forest Service identifies a temporary road, the Timber Sale Administrator with consult with the District hydrologist on the location of the road prior to approving its location and use. At that time, the District hydrologist would approve the location of the temporary road and describe any needed silt fences or waddles. The cost and labor for erosion control items will be covered by KV funds and Forest Service labor. Only those roads that have not been obliterated through the Total Maximum Daily Load (TMDL) process will be available for re-opening (map available).

Soil and Water Design Features for Root Ripping

1. Ripping would occur on the dry upland soils around parent trees in areas ranging in size from 1/8th of an acre to ~3 acres. Rip along contour. This would be a single-pass tractor-ripping technique and should be done when leaves are off. District Hydrologist would be consulted on location and timing of project. Fell trees or install fence around perimeter to discourage browse. Survey for goshawk nests or Purple Martin colonies prior to any tree felling. Example area is Chicken Lake wetland or other similar areas.

Soil and Water Common to All Clearcut, Mastication, or Burning Activities

Harvest and Mastication

1. Buffer perennial streams and wetlands by 100ft or by the mean height of mature dominant late-seral vegetation, whichever is greater (see also Leopard Frog criteria)
2. Include hydrologist field review input when designing buffers, marking boundaries, and reconstructing roads. Field review by hydrologist during layout may result in additional project design.
3. Restrict hydro-mowing and timber harvest activities during periods of spring snowmelt and periods of heavy rain when soils are too wet. Soils are too wet when the moisture content exceeds the plastic limit. If soils within 6 inches of the surface can be rolled into threads 3 millimeters in diameter without breaking or crumbling, they are too wet.
4. Do not drive machinery in riparian areas. Do not reduce/mechanically treat riparian-wetland vegetation.

5. Do not cross water conveyance structures such as ditches, pipelines, flumes, etc unless temporary crossings are used. Remove temporary crossings when project work is complete. Repair any damage to water conveyance structures.
6. Temporary roads must be scarified, reseeded, covered with debris, and effectively blocked after treatment.
7. Reserve clumps may be located in swales if they meet other objectives.

Prescribed Burning

1. Pull soil, duff, slash and rocks onto fire lines following completion of the project.
2. Install water bars on fire line where slopes are greater than 20%.
3. Re-seed dozer and ATV created fire lines if mineral soil is exposed.
4. Re-install drainage features in roads used for fire management if disturbed by implementation.
5. Scatter brush/limbs onto roads used upon completion of prescribed fire implementation that are not intended for public use afterwards.
6. Temporary roads and landings used for fire management should be scarified, re-seeded, covered with debris, and effectively blocked within one season after their intended use.
7. Prohibit ATV use in riparian-wetland areas.
8. Avoid ATV use on slopes greater than 30%.
9. Limit ATV stream crossings to the minimum number necessary to treat a unit. Cross streams perpendicular to the direction of flow and do not cross stream if banks exceed 30% slope.

Appendix C – Monitoring Plan

This monitoring plan would be adopted if Alternative B is chosen. If Alternative A is chosen only item 4 related to ongoing research would apply.

There are four reasons to monitor 1) monitoring to inform adaptive management actions for regeneration 2) monitoring of areas next to ponds or wetlands for potential root ripping 3) monitoring of prescribed fire vegetation response and 4) to consider research information as it becomes available from the Gunnison Forest Health Group or Fort Lewis student researchers.

1) Monitoring to Inform Adaptive Management Actions for Regeneration

This information will be used to determine if additional techniques should be applied to clearcut harvests in the Aspen project area such as adjustments to timing of harvest, type of harvest, post harvest burning, or whether or not a stand with a certain level of mortality should be dropped from treatment. Browse information could lead to additional actions such as hinge-cutting or adjusting timing of cattle grazing.

The purpose of the monitoring described below is to understand the regeneration response in SAD stands to help answer the following questions,

> What is the relationship between the percent mortality in a SAD stand at the regeneration response?
>
> What is the relationship between the time of harvest (leaf off versus leaf on) and amount of slash on regeneration response?
>
> What browse impacts are occurring?
>
> What is the regeneration response in SAD aspen stands of similar elevation and soil type that are not clearcut?

In addition, this information can contribute to our overall knowledge of SAD but is designed to specifically address the questions above.

Specific Monitoring Actions for #1

Portions of following sales would be monitored. Each one of these sale areas has different characteristics. Each sale will have traditional 1st, 3rd, and 5th year regeneration surveys coupled with 3 monumented plots per sale area.

Sale name	*# of Units*	*Total acres*	*Total vol. ccf*	*Award Date*	*Harvest Date*
Oak Knolls2	6	146	3164	5/1/08	
HayCamp Pt	6	122	1656	6/1/08	Dec-Feb 09
Turkey Knolls	16	344	10,438	10/1/08	

Turkey Creek (first sale from this project)
Spring Creek (second sale from this project)

Step 1 – Choose sale units (stands): For each of the sale areas above, select 3 cut units and one uncut unit to monitor. Within each of the units establish 2 monumented monitoring plot. Choose one unit representative of the level of SAD in the sale area with 2 plots different (higher and lower SAD levels) if possible. Additionally 1 control stand will be surveyed that should represent the average level of SAD.

Step 2 – Gather existing pre-harvest information for all units in the sale area: Search for past stand exam data that occurred recently. Summarize data in spreadsheet with key variables for the stand such as, trees/ac, ave Dbh, % live, diseased and dead% and regeneration (*note: focus on mortality, not the causes of mortality*). After cut occurs note whether it was leaf on or leaf off.

Step 3 – Establish the monumented plot locations and monument them with a permanent stake and a photo-point taken in cardinal directions that can be repeated. GPS plot locations. Conduct a pre-harvest fixed plot stand exam.

Step 4 – Do 1st year regeneration survey using standard procedures for all cut units in the sale area. Surveys occur in July. Take note of browse conditions on all survey plots. Place small metal exclosures in stands where heavy browse is suspected or initiate hinge cut (see Sale Area Improvement Plan in Chapter 2). At the same time, visit the monumented plots, do a fixed plot, take photos, and do a Brown's transect or other method to quantify the dead/down material on the monumented plot. Describe browse. Identify certain shrubs and native bunch grasses. This also occurs at the untreated plot.

Continue on the 3rd and 5th year after harvest with regeneration surveys on cut units and re-visiting the monumented plots.

Annually review information and apply to implementation as applicable. Store information in spreadsheets and notebooks at the District.

After five years, re-evaluate this monitoring plan to see if there is a need to visit stands beyond the five year time period.

In addition, as part of the Turkey Knolls T.S. a transect will be established to monitor the effects of clearcut harvest and regeneration on Parry's oat grass and visa versa.

Estimated Costs for #1
Step 1 and 2 : 2 days GS-9 forester, $250/day x 2 days $500, Step 3, 1 day/sale area, 2 crew 1 GS9 $250/day, 1 temp$120/day total $350/day x 3 sales $1050. Total all $1550

2) Monitoring to identify the location and extent of opportunities for root ripping near wetlands.

The purpose of this monitoring is to better understand the extent of aspen tree mortality around selected wetlands and identify opportunities for root ripping in the upland adjacent to the wetland.

Within selected wetlands, what is the overstory condition within 100 feet of the edge of the wet area?

Within the 100 foot area, what level of natural regeneration is taking place?

Specific Monitoring Actions for #2

Step 1 – Select wetlands to review
Step 2 – Visit in field, describe overstory vegetation within 50? 100? Feet of wet area edge – species type, size, and percent crown fade. If dead note if recently dead or snag from before SAD.
Step 3 – establish photpoints to get a representative view of area – 2-5 points per wetland area.
Step 4 – review information in year one
Step 5 – If root ripping action is chosen – revisit photopoints up to three years after root ripping is completed. Also place a few random fixed plots on the site and count sprouts.

Estimated Costs for #2

Step 1 : 1 GS-9 1 day review $250/DAY, Step 2-5 1 day GS-9/wetland (2 areas) initial, 1st/3rd year total 3 visits at $250/day. Total $1000]

3) Monitoring Plan to inform future managers about the effects of large prescribed fires on aspen and other vegetation on dry sites.

The purpose of this monitoring is to inform future managers of the response of vegetation to fire and in particular whether or not fire can help maintain aspen on drier sites.

Questions to ask are,

> What is the pre-fire vegetation composition of the burn areas?
>
> What is the pre-fire aspen forest condition at representative sites such as trees per acre, percent mortality, and current regeneration?
>
> What is the post fire aspen regeneration response in those same representative sites?
>
> What is the long term success of aspen regeneration after burning?

Specific Monitoring Actions for #3

Suggest a walk thru grid quick plot exam 1/5 acre plot every 10 chains covering a variety off vegetation types and topography.
Assess the

% burned
severity
vegetative response including sprouting

Estimated Costs for #3

Estimate 1 GS-11(ecologist)at $300/day 1 day prep, 1 day pre-burn survey, 1 day post burn survey survey total = $900

4) Gathering information from ongoing research efforts

Ongoing research efforts about SAD can be used to inform implementation of this project as the study findings become available, or can add to our overall knowledge about SAD.

The Gunnison Service Center Forest Health Group is conducting paired plot inventories and some of these plots are located in the analysis area. The study has run for two seasons now and will continue. Each year's data and conclusions will be reviewed for how it might apply to this project. In addition, an applied sivlicultural assessment is underway on the Grand Mesa Uncompagrhe Gunnison National Forest, as well as an aspen regeneration project on the Norwood District. Staff involved with these projects will be contacted regularly to check status and share outcomes.

The Fort Lewis Biology Department Senior Thesis project includes studies within the analysis area that will begin summer 2009. Plots will be set up in untreated SAD areas for research about avian species in different levels of SAD aspen mortality. Additional researchers from the college may use these same plots over the next few years and share their findings with the Forest Service. Plots will be set up in untreated SAD areas for research about numerous ecological attributes in different levels of SAD aspen mortality. Some of these ecological attributes include avian species richness and diversity, small mammal richness and diversity, prevalence of Sin Nombre Virus, understory vegetation richness and diversity, forest stand characteristics such as regeneration, density, basal area, and canopy cover, and fuel loading.

The Turkey Knolls Timber Sale EA, requires a preharvest vegetation transect be established in unit 3 of the sale. This transect is intended to study the pre and post harvest conditions of Parry's Oatgrass in the long term.

The Mancos Watershed Group may have volunteers available to help Forest Service staff establish and visit these riparian areas, or visit the permanent plots identified above.

Cost estimate 1 day GS-9 ($250) to track research (most of this is part of continuing education and workload.), 1 day GS 11 ($300/day, 2 days initial and post treatment. Total $850

5) Box Canyon Watershed Follow Up Monitoring

Conduct follow up monitoring in the Box Canyon for fine sediment in the upper reaches pre- and post-harvest. This monitoring would repeat pebble count monitoring that was performed in 2006 for the Box Canyon TMDL Evaluation Final Report, May 31, 2007.
1 GS-11 Hydrologist and 2 crew members $600/day, 2 days $1200 total

6) Total for all Monitoring

Total for all monitoring would be approximately $5,500 for all phases spread over about 3 years.