

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes and compares the alternatives considered for the proposed Cottonwood II Vegetation Management project. It includes a description of each alternative considered and maps of the project area. This chapter also presents the alternatives in comparative form, defining the differences in features and effects among alternatives.

2.2 Desired Future Conditions (DFC)

The B-TNF has been mapped into DFC areas to guide management of Forest resources. Although four DFCs are found within Management Area 25 (see *Section 1.6.1, The Land and Resource Management Plan for the B-TNF*), only two DFCs are addressed through implementation of the action alternatives: DFC 1B and DFC 10. Each DFC has a theme and management prescription that ties the DFC to specific Forest Plan goals. Forest Plan goals applicable to DFC 1B and 10 are described in Appendix A.

2.2.1 DFC 1B—Substantial Commodity Resource Development with Moderate Accommodation of Other Resources

Theme. An area managed for timber harvest, oil and gas, and other commercial activities with many roads and moderate to occasionally substantial emphasis on other resources.

Management Emphasis. Management emphasis is on scheduled wood-fiber production and use, on livestock production, and other commodity outputs.

Forest Plan Goals Addressed (see Appendix A). 1.1(a-d, h, i), 1.2(a-f), 1.4(a), 2.1(a,b), 2.4(a,b), 2.5(a-c), and 4.2(a-c).

Alternative B, the Proposed Action, has vegetation treatments over 979 acres of DFC 1B, which represents 94 percent of the stand area treated. Alternative C, Reduced Harvest and Temporary Roads, has vegetation treatments over 915 acres of DFC 1B, which represents 94 percent of the stand area treated.

2.2.2 DFC 10—Simultaneous Development of Resources, Opportunities for Human Experiences, and Support for Big Game and a Wide Variety of Wildlife Species

Theme. An area managed to allow for some resource development and roads while having no adverse and some beneficial effects on wildlife.

Management Emphasis. Management emphasis is to provide long-term and short-term habitat to meet the needs of wildlife managed in balance with timber harvest, livestock grazing, and minerals development. All surface-disturbing activities are designed to have no effect or beneficial effects on wildlife. If any portion of this area contains grizzly bear habitat, no surface-disturbing activities can occur there until the grizzly bear cumulative effects model can be run to help determine potential affects on grizzly bears.

Forest Plan Goals Addressed (see Appendix A). 1.1(a-i), 1.2(a-f), 2.1(a,b), 2.3(a), 2.4(a,b), 2.5(a-d), 4.1(a,b), 4.2(a,c,d), 4.3(a-c), 4.4(a-c), 4.7(a-d).

Alternative B, the Proposed Action, has vegetation treatments over 62 acres of DFC 10, which represents six percent of the stand area treated. Alternative C, Reduced Harvest and Temporary Roads, has vegetation treatments over 59 acres of DFC 10, which represents six percent of the stand area treated.

2.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to explore and evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14).

One alternative, the Maximum Timber Harvest Alternative, was identified and eliminated from detailed study. Reasons for its elimination include the following:

- While the CPIS did identify greater areas of opportunity for timber harvest, the timeframe envisioned for implementing the opportunities was longer than the 5- to 10-year duration anticipated for projects in this analysis. Future harvest entries would be needed to fully implement the CPIS, which would involve further detailed, site-specific analysis.
- Implementing all identified harvest opportunity areas in a short time period could result in exceeding created opening standards in the Forest Plan.
- Wildlife issues that have arisen since the CPIS such as conservation of Canada lynx and Colorado River cutthroat trout habitat, as well as the national roadless initiative, would preclude harvest of all opportunity areas identified in the CPIS.
- Timber harvest in a short time period, to meet harvest opportunity levels stated in the CPIS, may not fully comply with the purpose and need and desired conditions related to wildlife habitat and watershed conditions.

The Maximum Timber Harvest Alternative is described in the following text.

2.3.1 Maximum Timber Harvest Alternative

Several responders to scoping requested greater timber harvest levels to implement harvest opportunity areas identified in the CPIS. Harvesting all the harvest opportunity areas would result in 11,339 acres of timber harvest. The public respondents pointed to

forest health problems, advanced age of timber stands, meeting desired future vegetation conditions and harvest rotations stated in the Forest Plan, and meeting age class and vegetative diversity goals, as reasons to implement this alternative and apply treatments to a greater area of vegetation. Timber harvest levels proposed in the alternatives carried forward for detailed analysis (and described below) are well below the timber harvest levels identified for harvest opportunity areas.

2.4 Alternatives Considered in Detail

The *B-TNF Forest Plan* (Forest Service) establishes Forest-wide standards and guidelines for management of vegetation and for vegetation management specific to MA 25, Cottonwood Creek.

To follow the revised Forest Plan's direction in vegetation management, the Forest Service developed three alternatives in response to issues raised during public and internal scoping for the proposed project that are considered in detail in this Draft EIS:

- **Alternative A.** No Action Alternative (no vegetation management or road/trail improvements)
- **Alternative B.** Proposed Action (1,041 acres of treatment plus 1,058 acres of aspen burn)
- **Alternative C.** Reduced Harvest and Temporary Roads (974 acres of treatment plus 1,058 acres of aspen burn)

Each of the three alternatives is described in the following text.

2.4.1 Alternative A—No Action Alternative (No Vegetation Management or Road/Trail Improvements)

Under the No Action Alternative, no vegetation management activities would occur in the North and South Cottonwood Creeks drainages. Degrading aspen stands would not be regenerated with subsequent improvement of elk habitat. There would be no road or trail improvements and culverts acting as fish passage barriers or not acting as fish barriers would not be addressed. It would likely not be possible under the No Action Alternative to comply with Forest Plan direction relative to vegetation management in MA 25, Cottonwood Creek. Desired future conditions, as described in the Forest Plan and shown above, would not be attained.

Under the No Action Alternative, routine maintenance of existing roads and trails would continue, as would suppression of fire and District-wide Christmas tree and firewood sales. Oil and gas activities, outfitting, and range management covered by other site-specific decision documents would also continue to occur.

2.4.2 Alternative B—Proposed Action

The Proposed Action was developed in response to issues from initial public scoping, changes in resource demand since the CPIS, and recently identified resource issues. The Proposed Action is also designed to improve Forest resource conditions as identified in the CPIS. Table 2-1 shows vegetation treatments by treatment area that would occur under the Proposed Action and Figure 2-1 shows the location of the treatment areas within the analysis area. Table 2-2 shows the acreage and percent of each treatment area to be affected by vegetation treatments.

TABLE 2-1
Vegetation Treatment Areas, Methods, and Extent Under the Proposed Action

Treatment Area	Proposed Acres Treated			Treatment Method ^b					
	DFC 1B ^a	DFC 10	Total	CC	TH	SW	S	GS	Aspen
South Cottonwood	581	22	603	276	123	85	109	10	0
Halverson (Lower North Cottonwood)	177	0	177	41	0	40	30	40	26
McDougal Gap	64	40	104	64	30	10	0	0	0
Sjhoberg	97	0	97	20	34	10	0	0	33
Nylander	60	0	60	0	60	0	0	0	0
Sub Totals (Harvest)	979	62	1041	402	247	145	139	50	58
Aspen Burn									1,058
Total	979	62	1041	402	247	145	139	50	1,116

^a Desired Future Condition 1B – Substantial commodity resource development with moderate accommodation of other resources; Desired Future Condition 10 – Simultaneous development of resources, opportunities for human experiences, and support for big game and a wide variety of wildlife species

^b CC- Clearcut; TH – Thinning; SW – Shelterwood; S – Salvage; GS – Group Selection; Aspen – Aspen Treatment

Proposed Action activities are anticipated to take place over a 5- to 10-year period and include the following:

- 1,116 acres of aspen treatments including 58 acres of conifer removal
- 581 acres of partial-cut treatments
- 402 acres of regeneration harvest
- 1 mile of road relocation and trailhead improvement in the Nylander Creek drainage
- 1 mile of road reconstruction in the South Cottonwood Creek drainage
- Culvert replacement and stream-crossing improvement work on timber haul roads

These activities are described in greater detail in the following text.

Figure 2-1 (color, 11x17)

Figure 2-1 (color 11x17)

2.4.2.1 Aspen Treatments

Approximately 1,116 acres of aspen stands would be treated to regenerate healthy aspen and remove conifers that are growing into the stands and replacing the aspen component. The primary treatment would be prescribed fire, facilitated by some mechanical treatment to increase ground fuels that are needed to provide a fuel bed for better burning. Aspen regeneration through commercial harvest (removal) of encroaching conifers would occur on approximately 58 (5 percent) of these acres. Treatment areas where conifer removal would occur include Halverson and Sjhoberg. Slash would be treated with prescribed burning or piling and burning. Some of the areas of aspen identified above could be treated using Knutson-Vanderberg (KV) funds adjacent to areas of harvesting. Elk use these areas for spring calving because of the mixture of sagebrush and aspen, along with the edge effect they offer. These areas also provide forage for elk during their transition from winter feeding grounds. The proposed treatment is intended to promote aspen regeneration from root suckering that would provide increased cover and feed for elk calves, mule deer fawns, and other wildlife that utilize aspen habitat.

TABLE 2-2
Proposed Action Treatment Areas and Treatment Percentage in the Cottonwood II Analysis Area

Treatment Area	Total Acres	Treatment Type		Percent of Treatment Area Treated
		Harvest	Burn	
South Cottonwood	15,811	603	414	6.4
Halverson (Lower North Cottonwood)	4,556	177	55	5.1
McDougal Gap	4,548	104	0	2.3
Sjhoberg	2,379	97	291	16.3
Nylander	3,600	60	298	10.0
Total	30,894	1,041	1,058	6.8 percent of all treatment areas

2.4.2.2 Partial-Cut Treatments

Partial-cut treatments are proposed on approximately 581 forested acres to thin overstocked conifer forests while maintaining a forested appearance. The objective is to leave the healthiest trees of diverse species while reducing losses caused by insects and disease and allowing for the salvage of wood products. These proposed treatments would take place in stands where tree growth is greatly reduced or where mortality of trees exceeds growth. The remaining trees would have improved utilization of resources available to support tree growth on the site, while still providing habitat for forest-dependent wildlife species. Approximately 3 to 10 thousand board-feet (MBF) would be removed per acre, dependent on the site and numbers of healthy trees required to be left to provide a forested appearance and habitat. Slash from harvesting would be treated by

piling slash concentrations (35 percent of the area), lopping and scattering along with whole tree harvesting (50 percent of the area), or hand piling (15 percent of the area).

Silvicultural methods used to achieve the partial-cut treatment include group selection, sanitation salvage, thinning, and shelterwood. Group selection would occur in the South Cottonwood and Halverson treatment areas on 50 acres. Group selection would occur in uneven-aged stands with a diverse canopy cover. Trees would be removed in groups up to 2 acres in size, with all other trees on the site retained. At least 60 percent of trees in the entire stands would be retained. A few trees and snags would be retained in the larger groups and Engelmann spruce regeneration would be encouraged where trees are removed.

Shelterwood harvest would occur on 145 acres in all treatment areas except Nylander. This silvicultural option is best utilized where mature, healthy overstory trees are present in sufficient density to help regenerate the site following harvest. Approximately 40 to 50 percent of the healthiest overstory trees would remain following treatment, with Engelmann spruce and Douglas-fir favored as leave trees. Snags would be left standing to provide additional habitat and stand diversity. The density of leave trees would be sufficient to maintain a forested appearance, provide wildlife habitat, protect the watershed, and provide seed sources for stand regeneration. Most understory, damaged, and diseased trees would be removed in the harvest.

A total of 139 acres in the South Cottonwood and Halverson treatment areas would be treated using a sanitation salvage silvicultural method. This harvest technique would focus on stands with mature and over-mature trees, where there is significant tree mortality or damage. Standing dead with sound wood, severely damaged, and insect infested trees would be removed, with approximately 50 to 80 percent of the healthiest overstory trees retained. Snags and healthy understory trees would be retained to maintain a forested appearance and structure.

Commercial thinning would occur on 247 acres in all treatment areas except Halverson. Suitable stands for this silvicultural technique are those where healthy, but less than mature, trees exist in dense stands. Trees left standing would be scattered throughout the treatment area, at approximately 20- to 25-foot spacing, with a target residual basal area of 40 to 60 percent of the original stand basal area. This residual density would allow for some variance in selecting healthy leave trees to provide a diverse site. Lodgepole pine would be targeted for removal and some clumps of un-thinned trees and snags would be left. Conifer cutting would be heavier in scattered aspen patches to favor aspen regeneration. Most Douglas-fir and Engelmann spruce, which comprise approximately five percent of the stands, would be left. Understory trees would be removed to reduce fuel density, yet still retain stand structure, a forested appearance, and healthy trees. Slash tops would be yarded to a landing area and concentrations of slash would be piled by hand or small equipment and then burned.

2.4.2.3 Regeneration Harvest

Harvesting trees using regeneration harvests is proposed on approximately 402 acres to provide for regeneration of declining lodgepole pine and mixed conifer forests and to enhance age class diversity across the landscape. This treatment entails removing most

merchantable trees through a commercial timber sale on the 402 acres. Regeneration of healthy new stands would be accomplished by planting with lodgepole pine or Englemann spruce or providing for natural regeneration, depending on site conditions. KV funds would be used for tree planting, surveys, and site preparation activities to achieve natural regeneration. Individuals and groups of healthy seed trees, snags, and groups of healthy non-merchantable trees would be left for seed, habitat, and diversity, where they are available on up to 15 percent of the stand. Openings created through harvest would range in size from 5 to 20 acres. Age class diversity in the drainage created through harvesting is important to reduce losses caused by insects and disease and would be designed to reflect historically occurring conditions.

Additional uses of KV funds would be to treat noxious weeds, survey partially cut areas, reduce dwarf mistletoe adjacent to harvest areas, and treat other insect and disease conditions adjacent to harvest areas.

Approximately 13.8 miles of temporary roads and skid trails would be constructed, over a several year period, to carry out silvicultural activities. Roads would only be constructed as needed to access a treatment unit and then closed immediately after treatment. The amount of temporary roads open in any given year is not expected to exceed the Forest Plan road density standards. However, if the situation occurs where the length of open temporary roads does exceed the Forest Plan standard while they are open, the roads would be gated and locked. This would meet the intent of the Forest Plan standard to protect wildlife habitat from disturbance. The temporary roads would be closed, obliterated, and the habitat restored immediately after they are no longer required. No new permanent roads would be constructed, except for the Nylander re-location as described below, to complete the treatments as part of the Proposed Action.

2.4.2.4 Road Relocation and Trailhead Improvement: Nylander Creek Treatment Area

The Proposed Action includes timber haul road relocation and end-of-road trailhead improvements. Approximately 1 mile of the existing Nylander Road, which is to be used as a timber haul road for tree thinning units, would be re-located out of the riparian area to the dry ridge area to the east. The relocation would reduce road-related sediment delivery into Nylander Creek. The existing road, which is easily rutted, difficult to maintain, and contributes sediment directly to Nylander Creek, would be reclaimed. The re-located road would end at an existing dispersed camping area, which would be managed to include trailhead facilities. A low-standard road beyond this point, which crosses boggy, wet soils, would be closed.

2.4.2.5 Road Reconstruction: South Cottonwood Treatment Area

Reconstructing the South Cottonwood Road from Hidden Basin to just short of the South Cottonwood Creek crossing (approximately 1 mile) would provide safe access for log trucks, livestock haulers, and recreation traffic. Currently the road is narrow, with no turnouts.

2.4.2.6 Culvert Replacement and Stream-Crossing Improvement

Culverts would be replaced and stream crossings improved to compensate for potential adverse effects to the Colorado River cutthroat trout from implementation of the Proposed Action (timber harvest). The increased amount of habitat created by improving fish passage or preventing upstream migration of undesirable fish will result in an overall positive effect. Culvert replacement is also needed because of road design, access, and increased flows expected from the Proposed Action.

The 1998-99 road and stream-crossing inventory and a July 2, 2004, field review were used to identify potential culvert replacements and stream-crossing improvements along the timber haul routes. All culverts along haul routes to be used for this project were evaluated for replacement or improvements during timber sale design. Culverts would be designed to either act as fish barriers where genetically pure populations of Colorado River cutthroat trout (CRCT) occur upstream, or to allow passage of fish, as identified in the inventory and survey. Twelve culverts and two bridges have been identified as needing improvements (Figure 2-2). Table 2-3 presents the details of each improvement.

2.4.3 Alternative C— Reduced Harvest and Temporary Roads

The management objective of Alternative C is the same as the Proposed Action. However, in response to public scoping comments suggesting an alternative with less timber harvesting using clearcutting, the Forest Service IDT developed Alternative C, Reduced Harvest and Temporary Roads.

Alternative C reduces the number of acres where vegetation management is achieved through harvesting, as well as reduces the number of acres harvested through clearcutting. Alternative C also reduces the number of temporary roads needed for the treatments and increases the number of acres of aspen treated to improve habitat. As shown in Table 2-4, the number of clearcut acres is reduced from 402 to 262 acres. Acres to be thinned increase by 19 acres to 266 acres and 13 fewer acres would be treated using a shelterwood cut (132 acres total). Sanitation salvage tree removal is increased by 18 acres (157 acres total) and there would be 11 additional acres treated through group selection (61 acres total). Acres of aspen treatment through harvesting encroaching conifers would be increased from 58 acres to 96 acres. There would be no change in aspen acres treated by burning. Table 2-5 shows that the length of temporary roads needed to implement the treatments would decrease by 4.5 miles compared to the Proposed Action. No new permanent roads would be constructed as part of this alternative. All other project features, including culvert replacement and stream-crossing improvements, would remain similar to the Proposed Action. Table 2-6 shows the percentage of each treatment area to be affected by vegetation treatments. Figure 2-3 shows the location of treatments and roads for Alternative C.

Figure 2-2 (color 8-1/2 x 11)

Figure 2-2 (color 8-1/2 x 11)

TABLE 2-3
Stream Crossing Improvements Associated with the Cottonwood II Vegetation Management Project

Road Name and Stream Crossed	Structure Type	Proposed Improvement
North Cottonwood Road #10125		
Irene Creek	Culvert	Designed fish barrier. Riprap up-stream side of culvert on the right side. Place boulders on the left side of the culvert to protect bank and channel water into the culvert.
Halverson Creek	Culvert	Designed fish passage. Replace with larger squashed culvert and riprap both ends.
Hardin Creek	Culvert	Designed fish barrier. Riprap steep bank on down-stream side of the culvert and clean or replace concrete pad.
Ole Creek	Bridge	Designed fish passage. Evaluate for a bridge with wings to channel water through or replace with a longer bottomless arched culvert, as road material is being pushed into the creek when bladed. The bridge would be wide enough to provide for snowmobile grooming equipment, as this is part of the groomed snowmobile trail system. If a new longer culvert is used, riprap on both sides of the culvert.
North Cottonwood Creek	Bridge	Designed fish passage. Replace bridge with a wider bridge to accommodate snowmobile trail grooming equipment. Install new over-flow culvert on road about 100 feet above bridge to provide for waters being backed up as a result of beaver dams.
North Cottonwood Creek and Nylander Creek junction	Culvert	Designed fish passage. Remove culvert at junction of North Cottonwood Road and Nylander road and re-route new culvert across Nylander road.
Upper North Cottonwood Creek	Culvert	Designed fish passage. Replace culvert with a bridge with wings to channel water through. Design bridge wide enough to accommodate snow grooming equipment.
McDougal Road #10342		
McDougal Creek	Culvert	Designed fish passage. Replace existing two culverts with one larger squash culvert and riprap both ends.
Sjhoberg Road #10346		
North Cottonwood Creek	Culvert	Designed fish passage. This is the first culvert on the Sjhoberg road where North Cottonwood Creek crosses: Replace culvert with a larger squashed or bottomless arched culvert and riprap on both ends.
South Cottonwood Road #10050		
Bare Creek	Culvert	Designed fish barrier. Riprap lower end of culvert.
Trailer Creek	Culvert	Designed fish passage. Install new, larger squashed culvert and riprap both ends. Build up road-bed on both sides of culvert to eliminate the bump over culvert.
Hidden Basin Creek	Culvert	Designed fish passage. Install larger squash culvert back to grade of stream and riprap both ends. Also riprap steep banks on lower catch pool.

TABLE 2-3
Stream Crossing Improvements Associated with the Cottonwood II Vegetation Management Project

Road Name and Stream Crossed	Structure Type	Proposed Improvement
Bare Creek Road #10046		
West Fork Bare Creek	Culvert	Designed fish passage. Riprap both ends of culvert.
Un-named Bare Creek Tributary	Culvert	Designed fish passage. Replace culvert with larger and longer squashed culvert. Road material is being pushed into stream when bladed. Realign culvert with stream and riprap both ends.

TABLE 2-4
Comparison of Proposed Action (Alternative B) and Alternative C Vegetation Treatments

Treatment Area	Vegetation Treatment *						Total Acres
	CC (acres)	TH (acres)	SW (acres)	S (acres)	GS (acres)	AS (acres)	
South Cottonwood							
Proposed Action	276	123	85	109	10	0	603
Alternative C	168	152	73	112	12	68	585
Halverson (Lower North Cottonwood)							
Proposed Action	41	0	40	30	40	26	177
Alternative C	26	0	40	45	20	16	147
McDougal Gap							
Proposed Action	64	30	10	0	0	0	104
Alternative C	48	30	9	0	19	0	105
Sjhoberg							
Proposed Action	20	34	10	0	0	33	97
Alternative C	20	24	10	0	10	12	76
Nylander							
Proposed Action	0	60	0	0	0	0	60
Alternative C	0	60	0	0	0	0	60
Total							
Proposed Action	402	247	145	139	50	58	1041
Alternative C	262	266	132	157	61	96	974

* CC = Clearcut; TH = Thinning; SW = Shelterwood; S = Salvage; GS = Group Selection; AS = Aspen Treatment

TABLE 2-5
Roads Associated with the Proposed Action and Alternative C *

Roads	Proposed Action (miles)	Alternative C (miles)
Open	26.4	26.4
Restricted Access	25.3	23.4
Temporary	13.8	9.3

* All open and restricted access roads currently exist and do not represent new roads to be constructed. Temporary roads would be constructed as part of the proposed project and restored following project implementation.

TABLE 2-6
Alternative C Treatment Areas and Treatment Percentage in the Cottonwood II Analysis Area

Treatment Area	Total Acres	Treatment Type		Percent of Treatment Area Treated
		Harvest	Burn	
South Cottonwood	15,811	519	414	5.9
Halverson (Lower North Cottonwood)	4,556	214	55	5.9
McDougal Gap	4,548	105	0	2.3
Sjhoberg	2,379	76	291	15.4
Nylander	3,600	60	298	10.0
Total	30,894	974	1,058	6.6 percent of all treatment areas

2.5 Comparison of Alternatives

2.5.1 Vegetation

Under the No Action Alternative, no effects from vegetation management treatments would occur except for occasional removal of dead trees along roads for firewood under personal use firewood permits. However, fire disturbance would continue to not be allowed to play its historic role. Vegetation manipulation using timber harvest, which began in the 1920s, would discontinue. Stands already changed by harvest would receive no further management or maintenance. Conifers would continue to grow into the aspen stands, replacing the aspen component. The risk of stand replacing wildfire, in the

absence of smaller scale disturbances, particularly in older conifer forests would continue and increase.

Manipulation of vegetation on 2,099 acres under the Proposed Action would help achieve desired conditions in the five treatment areas. The effects would be to thin overstocked conifer forests while maintaining a forested appearance; regenerate declining lodgepole pine and mixed conifer forests and to enhance age class diversity across the landscape; and to regenerate healthy aspen and remove conifers that are growing into the stands and replacing the aspen component. The risk of stand replacing wildfire would be reduced on a small scale. The construction of temporary roads and skid trails would result in the temporary loss of forest productivity and habitat for 5 to 10 years. Relocation of a portion of Nylander Road out of the riparian area would restore riparian habitat.

Manipulation of vegetation is proposed on 2,032 treatment acres under Alternative C to help achieve desired conditions and respond to project issues in the five treatment areas. Additional acres of aspen are treated with this alternative and less forested area would be disturbed by clearcutting and constructing temporary roads and skid trails. Other effects to vegetation would be similar to those described for the Proposed Action.

2.5.2 Wildlife

There would be no direct impacts on wildlife from the No Action Alternative (Alternative A). Over time, lack of forest management actions is likely to indirectly contribute to the decline in habitat values for elk and migratory birds that use aspen. The current conditions of dense mature conifer stands that often have limited herbaceous and shrub understories— which limits use by a number of species because of lack of cover and food—would continue.

With implementation of the Proposed Action (Alternative B), prescribed burns would reduce habitat for species that use mature aspen stands. However, in the absence of treatments, the quality of this habitat is declining. Primary and secondary cavity nesting birds would benefit from prescribed burns for several years. Declining aspen areas that are burned would provide renewed habitat for many species after they regenerate over a period of many years. Timber harvest and temporary roads would result in short-term increases in water temperature and sediment, with adverse effects on spotted frogs and other amphibians. Timber harvest would also remove habitat for species that use mature conifer forest. Aspen burning and timber harvest would increase herbaceous and shrub growth for 5 to 15 or 20 years, with benefits for big game and ground- and shrub-nesting species.

Figure 2-3 (color 11x17)

Figure 2-3 (color 11x17)

Direct and indirect impacts to all wildlife species from implementation of Alternative C would be similar to those described for the Proposed Action from aspen treatment, except for a greater area of aspen treated. Effects from logging and mechanical treatment would be somewhat less than under the Proposed Action, because fewer acres of coniferous forest would undergo treatment and there would be fewer created openings. Beneficial impacts would be approximately the same as under the Proposed Action. Long-term habitat improvement and progress toward desired future conditions (DFCs) would be somewhat less than under the Proposed Action, but greater than under the No Action Alternative.

2.5.3 Fire

Implementation of the No Action Alternative would result in a continued increase in fuel loading within timbered stands, loss of fire resistant aspen communities to succession, and decadence. Continued fire exclusion of all types would continue to exclude fire from playing its historical ecological role in the analysis area.

Alternative B would meet project purpose and need by treating 1,041 acres of conifer forest and 1,058 acres of aspen forest by burning in the analysis area. Thinning overstocked stands and harvesting timber (with effective activity fuel treatment) would modify fuel characteristics and help break up fuel continuity within the analysis area. Future expected fire behavior in treatment areas would be reduced. Fuel loads would continue to increase in unmanaged timber and aspen stands. Fire would be reintroduced under a controlled scenario to play its historical role in the analysis area. Aspen stands would be regenerated by commercial harvest and prescribed fire, providing forage and renewed cover for elk, which migrate through the area, and other wildlife. Encroaching conifers would be reduced in density and coverage by the Proposed Action. Surface fuel in aspen stands would be reduced, thus reducing potential fire behavior. Partial-cut treatments would be used in conifer forests to remove insect and disease-infested trees, further reducing future fuel loads.

Alternative C does not meet project purpose and need as well as Alternative B (Proposed Action). Under Alternative C, reduced harvest levels of 974 acres of conifer forest and meeting the proposed 1,058 acres of aspen burning only meets project need in part. Thinning overstocked stands and harvesting timber (with an effective activity fuel treatment) would modify fuel characteristics and help break up fuel continuity within the analysis area. Future expected fire behavior in treatment areas would be significantly reduced. Fuel loads would continue to increase in unmanaged timber and aspen stands. Fire would be reintroduced under a controlled scenario to play its historical role in the analysis area.

Overall, Alternative B proposes the most modification and reduction of fuels among the alternatives evaluated, and would therefore reduce future fire behavior within the analysis area the most. Commercially harvested units with post-activity fuels treatment also would be anticipated to reduce future expected fire behavior. Thinning regenerating stands would promote stand resiliency by reducing crown densities and promoting health of the

stand. The reduction of crown densities would decrease the chance of a stand-replacing crown fire.

2.5.4 Soils

The extent of detrimentally disturbed soils is within regional guidelines. There would be no change under the No Action Alternative. Detrimentially disturbed soil would increase slightly in the short-term with implementation of the action alternatives, but there would be no long-term impact.

2.5.5 Hydrology

Road density is not expected to increase with implementation of the No Action Alternative. One subwatershed currently exceeds the desired standard of 2.5 road miles per square mile. Road density would increase slightly with both action alternatives. Three subwatersheds would exceed the desired standard under the Proposed Action and two subwatersheds would exceed the desired standard under Alternative C. For broad scale evaluation, road densities should be maintained below 2.5 mile/square mile (Forest Service 2003a). At the watershed scale, this guideline will not be exceeded under any of the alternatives. However at the smaller subwatershed scale, some areas exceed the guideline because of localized activities. Because the guideline is based on a broad scale evaluation, these exceedances at the subwatershed level are not significant.

Hydrologically connected roads would decrease with implementation of both action alternatives. Equivalent clearcut area would not exceed 30 percent with implementation of any alternative. There would be a short-term increase in sediment deposition into streams with both action alternatives at culvert and bridge improvement locations. Overall, sediment deposition would decrease with action alternative implementation.

2.5.6 Fisheries

Currently suppressed Colorado River cutthroat trout (CRCT) population conditions in the analysis area are likely to continue with the No Action Alternative. Both action alternatives (Alternatives B and C) are expected to result in short-term disturbances to the aquatic system and, thus, CRCT and their habitat from sediment input into the streams. However, the long-term benefits of Alternatives B and C should lead to a reduction in chronic sediment inputs, especially under the Proposed Action (Alternative B). Both action alternatives would improve CRCT access to other potentially important habitats within the Cottonwood Creeks drainages that are currently unavailable. Overall, the expected effects (benefits) to CRCT habitat and passage from the action alternatives would provide a better opportunity for the recovery of the local CRCT populations than that of the No Action Alternative (Alternative A). The Proposed Action provides more opportunities for chronic sediment reductions than Alternative C. Both Alternatives B and C equally improve access to upstream habitats.

2.5.7 Sensitive Species

Any direct or indirect adverse impacts to any federally listed wildlife threatened, endangered, or candidate species; Forest Service wildlife sensitive species; or wildlife Management Indicator Species (MIS) are unlikely under the No Action Alternative.

During implementation of the Proposed Action treatments, grizzly bear, gray wolf, and Canada lynx may be disturbed. Grizzly bear foraging habitat may temporarily improve and snowshoe hare habitat should improve in burned aspen areas. Snowshoe hares are the primary prey for Canada lynx. The potential exists for impacts on several sensitive species. The determination for these species was that the Proposed Action may impact individuals or habitat, but would not likely contribute to a trend toward Federal listing or loss of viability to the population or species. Wildlife sensitive impacts from implementation of Alternative C would be similar to those described for the Proposed Action.

No adverse impacts are expected to any federally listed plant species from implementation of any alternative. Although there are known occurrences of Payson's milkvetch, Payson's bladderpod, and Shultz's milkvetch inside the analysis area, these occurrences are not located within proposed treatment areas and no adverse impacts from implementation of any alternative are expected. Habitat criteria for these species would predict that unknown populations of Payson's bladderpod and Shultz's milkvetch are unlikely to occur within the treatment areas. Payson's milkvetch is an early succession species and unknown populations of Payson's milkvetch may occur within treatment areas, but are not likely to be adversely impacted by any alternative.

2.5.8 Transportation

The only treatment activities identified for implementation in inventoried roadless areas are some aspen-prescribed burns not requiring roads under Alternatives B and C. Therefore, no impacts to roadless area character would occur. No permanent roads would be constructed under any alternative. A total of 13.8 miles of temporary roads and skid trails would be constructed under the Proposed Action. A total of 9.3 miles of temporary roads and skid trails would be constructed under Alternative C. All temporary roads would be restored to their original contour and vegetation type to avoid permanent impacts from road construction. Two bridges would be improved and one culvert would be replaced with a bridge. There would be a short-term sediment discharge increase to North Cottonwood Creek during construction, but no instream construction would be allowed. Traffic patterns would be disrupted during construction.

2.5.9 Heritage Resources

There is no potential for direct impacts on heritage resources under the No Action Alternative. Cultural resource sites would continue to be located, recorded, and protected from loss of integrity and physical damage primarily in reaction to ongoing resource management activities. There is the potential for indirect impacts to heritage resources under the No Action Alternative. If vegetation treatment projects are not implemented,

then the increase in dead and dying trees and accumulation of fuels could lead to large stand replacing wildfires that could destroy the many historic tie hack cabins that are present throughout the North and South Cottonwood drainages. There would be no cumulative effects to heritage resources under the No Action Alternative.

Under the Proposed Action, clear cutting on three units may result in an adverse effect to the Old Indian Trail because these harvest units may be visible from the trail. There would be no impact to other heritage resources because those sites will be avoided by project activities. Indirect impacts may include increased damage to historic properties, such as the tie hack cabins, because of increased public use or activities in the analysis area. The risk of stand replacing wildfire would be reduced resulting in lower potential for indirect effects to historic cabins in the event of wildfires. The removal of vegetation through prescribed burns may expose and facilitate the discovery and removal of artifacts. No cumulative impacts on heritage resources are anticipated under the Proposed Action.

Under Alternative C, the proposed harvest units near the Old Indian Trail propose cutting dead and dying trees only. Treatment of these units would reduce the visual intrusion to the trail compared to the Proposed Action. There would be no direct impacts on heritage resources under this alternative because all sites would be avoided. Indirect and cumulative effects would be the same as described for the Proposed Action.

2.5.10 Environmental Justice

None of the alternatives would cause disproportionate adverse human health or environmental direct, indirect, or cumulative effects to minority or low-income populations. During implementation of Alternatives B and C, there is the potential for employment of members of minority groups. Minority groups would not be disrupted by project implementation under either Alternative B or C, because implementation would occur in a completely rural setting where there are no permanent human residents and the population in adjacent areas is very dispersed.

2.5.11 Recreation

Implementation of Alternative A (No Action) would not change existing recreation opportunities. Adverse impacts to existing hunting opportunities would be expected from the lack of vegetation management activities. Adverse impacts to fishing opportunities are expected to continue from the ongoing sedimentation into Nylander Creek from Nylander Road. Existing fishing opportunities along the creeks in the treatment area would not be improved through culvert and stream crossing replacements. Recreation traffic safety would continue to be less than desired on South Cottonwood Road because of the road's current width and configuration.

Implementation of the Proposed Action (Alternative B) would result in some short-term disruption of spring, summer, and fall recreation opportunities and use in the treatment area through the closure of certain areas, trails, or roads, or through required detours. Habitat quality within the treatment area is expected to improve, which could result in more wildlife species inhabiting the area. Big game hunting opportunities may then

improve, and an associated benefit to hunters in the area may occur. A long-term reduction in potential for large-scale wildfire in the area is expected as a result of implementation of Alternative B, which would be a benefit to recreationists.

The action alternatives' (Alternatives B and C) vegetation management activities would potentially improve existing hunting opportunities, and provide associated benefits to hunters. The proposed relocation of Nylander Road and replacement of culverts and improvements to stream crossings could potentially improve fishing opportunities. Recreation traffic safety on South Cottonwood Road could potentially improve and provide associated benefit to recreationists traveling on that road.

2.5.12 Visual Resources

Vegetation management would not occur under the No Action Alternative and therefore, no visual impacts would be expected. Vegetation management under Alternatives B and C would result in some visual impact, particularly where the regeneration harvests are visible. Habitat quality within the treatment area is expected to improve, which could result in more wildlife species inhabiting the area.

2.5.13 Economics

There would be many non-market benefits from implementing the proposed project (Alternatives B and C), in addition to the market costs and benefits. The most important non-market benefit would be improvements in aspen stands, which would benefit wildlife and livestock. Estimated net revenue for the three alternatives is (minus) \$238,852 for Alternative A, (plus) \$284,283 for Alternative B, and (plus) \$216,048 for Alternative C. The estimated value to the community and taxes generated for the proposed project would be \$5,968,500 and \$895,275, respectively, under Alternative B, and \$5,190,000 and \$778,500, respectively, under Alternative C.

Based upon the effects of the alternatives, the responsible official will decide if an action alternative (Alternatives B and C) should be implemented or if No Action (Alternative A) is warranted at this time.

2.6 Mitigation Common To All Action Alternatives

Mitigation measures are designed to prevent adverse impacts or to contain non-significant impacts within acceptable limits during project implementation. Following are project design elements and mitigation measures that would accompany selection of any action alternative. These mitigations are specific to proposed projects and the project area. Standard contract provisions to protect other resources, including those that allow termination of contracts to prevent unforeseen environmental impacts, will be used for any timber sale project. Site-specific modifications to these mitigations may occur

during project implementation if deemed necessary by the District Ranger through field reviews by an interdisciplinary team (IDT); team members' specialties might include Soil Scientist, Hydrologist, and/or Wildlife and Fishery Biologist. Application of BMPs and

adherence to Forest Plan standards and current laws, policies, and regulations is assumed for all action alternatives. BMPs are found in:

- Silviculture Best Management Practices, Wyoming Non-point Source Management Plan, March, 1997, and Wyoming Forestry Best Management Practices brochure.
- Soil and Water Conservation Practices Handbook (Forest Service Handbook 2509.22).
- Forest Service Specifications for Construction of Roads and Bridges (Forest Service 1996b).

2.6.1 Recreation Mitigation

1. Timber hauling will not occur on holidays or during deer and elk season opening weekends.

2.6.2 Scenic Resources Mitigation

1. The sale administrator, prior to any ground disturbing activity, shall approve all staging/stock-piling areas. An erosion control plan will be prepared prior to any activity commencing.
2. All staging/stock-piling sites shall be screened from open system roads, trails, and popular recreation areas during all phases of project implementation.
3. Topsoil shall be preserved and utilized for phased rehabilitation. The timing of the phased rehabilitation shall comply with timing and techniques outlined in the rehabilitation mitigation measures.
4. Construct cut slopes no steeper than 2:1, except where the natural slope makes a 2:1 impossible or in areas of rock cuts. In these areas (greater than 2:1), creating serrations, benches, or terraces will be used to help hold the topsoil and vegetation.
5. All cuts/fills shall be shaped to create warped (varied pitches) slopes. The surface shall be left rough (not bladed smooth) so that the topsoil can bond and stay in place.
6. Ditches shall be U-shaped with rounded edges and revegetated.
7. Tops of cuts shall be rounded to blend with uphill topography.
8. Where stable, rock outcroppings on cut and fill slopes shall be retained.
9. All culverts shall have flared ends.
10. Topographic breaks and vegetation providing natural screening from critical viewpoints and corridors shall be maintained. Proposed alterations to the landscape shall be oriented and designed to best utilize natural screening potential.
11. Clumps of trees and individual leave trees within the proposed clearcut units shall be marked and retained.
12. Edges of irregularly shaped cuts shall be feathered to avoid unnatural lines between the cut areas and existing vegetation that remains. When possible, cuts should mimic

naturally occurring patterns, such as avalanche path clearings, to minimize visual impact.

13. Flush cutting (stumps no higher than 6 inches max.) shall be practiced within 100 feet of sensitive roads and developments in “Retention” areas.

2.6.3 Heritage Resources Mitigation

1. Historic properties determined to be eligible for the National Register of Historic Places will be avoided by project implementation.
2. Additional inventory and assessment of effects to heritage resources will be required for prescribed burn treatments once a specific burn plan has been developed. This mitigation measure is identified in the Programmatic Agreement among the Advisory Council on Historic Preservation, the Wyoming State Historic Preservation Office, and the Forest Service Regarding Implementation of the Prescribed Fire Program (FS Agreement No. 01-MU-11020000-015).

2.6.4 Watershed Mitigation

1. Where roads are hydrologically connected to the stream system they will be disconnected through various methods to protect aquatic resources.
2. Avoid slopes greater than 30 percent where soil erosion hazard is rated as “High.” If access is needed to conduct management activities, follow the natural landscape contours as much as possible, apply surfacing, and construct rolling dips and/or drainage to prevent excessive sedimentation.
3. Where revegetation is severely limited because of “slope,” avoid ground disturbance on slopes exceeding 24 percent. If these areas cannot be avoided, additional mitigation may be warranted to prevent loss of site productivity once soil is disturbed (that is, seed and mulching, additional tree planting, and/or application of soil stabilizers).
4. Leave adequate slash (10 to 12 tons per acre; greater than or equal to 3-inch-diameter material) to protect soils from accelerated erosion and loss of soil productivity. For lodgepole pine/spruce-fir ecosystems, a minimum of 5 to 10 tons per acre of large woody debris (greater than or equal to 3 inches in diameter) would remain scattered throughout the harvest unit to prevent erosion and provide microsites for new growth as well as short and long term nutrient cycling. This will not apply to areas immediately adjacent to prescribed burn areas.
5. Designate skid trails and restrict mechanical operations to periods of the year when the surface soil is dry, frozen, snow covered, and/or slash covered to reduce the risk of reducing soil porosity and infiltration characteristics. Heavy equipment would not be used when soil conditions are wet enough to rut, displace, and/or bury organic matter and/or in areas where understory vegetation indicates forested riparian conditions. Lopping and scattering limbs and branches on landings and skid trails would be required to help mitigate compaction.

6. Monitor implementation of BMPs. Monitoring of project implementation and watershed protection practices would be developed and included in the KV plan for the timber sale.
7. Meet the Soil Quality Standards and Guidelines (Forest Service 1995b) using the regional Soil Management Handbook (FSH 2509.18) as guidance to determine mitigation needs during project implementation.
8. All temporary roads will be treated to bring the disturbed area back into hydrologic function (ripped and water barred) and where designated, seeded with approved seed mixes.
9. Following project activities, review roads for possible additional closures or obliteration.

Mitigation measures will be applied as part of all action alternatives.

2.6.5 Fisheries and Threatened, Endangered, and Sensitive Species Mitigation

The primary purpose of these mitigations is to minimize damage to stream channels and fish habitat, and minimize soil loss and water quality deterioration. The following mitigations reference the *B-TNF Land and Resource Management Plan* (Forest Service 1990) and the R1/R4 Soil Management Handbook (Forest Service 1988).

2.6.6 Timber Harvest and Prescribed Fire Mitigations

Removal of vegetation cover from timber harvest and prescribed fire activities has both short and long term potential impacts to aquatic resources. Mitigation to protect aquatic systems includes the following:

1. Prohibit timber harvest on either side of perennial and intermittent streams, and wetlands from the outer edges of riparian vegetation to top of inner gorge, or 150 feet slope distance (300 feet total), whichever is greatest.
2. Prohibit prescribed fire ignition, camps, cleared fire lines, storage of hazardous substances (lubricants, gas, retardant, etc.) within streamside areas as defined in Measure 1 above.
3. In cases where the riparian buffer cannot be protected from prescribed fire within a reasonable cost constraint, or the IDT defines a vegetation prescription that allows/recommends lightly burning through the riparian area, then additional mitigations may apply. These mitigations to minimize soil loss and deterioration to water quality may include seeding and planting disturbed areas, installing water bars, or spreading slash.
4. Livestock grazing would be deferred until ground cover reaches 60 percent.
5. Enhance pool habitat in all perennial streams with resident fish populations within the sale area boundary by placing large woody debris (LWD), through the use of KV funds.

2.6.7 Roads Mitigations

Road design, limitation on use, restoration, and maintenance are the primary factors controlling erosion and sedimentation of stream channels.

1. For each existing and planned road (including temporary roads), avoid adverse impacts to aquatic habitats by development and implementation of a Road/Transportation Management Plan. At a minimum, address the following items in the plan:
 - Road design criteria, elements, and standards that govern construction and reconstruction
 - Road management objectives for each road
 - Criteria that govern road operation, maintenance, and management
 - Requirements for pre-construction, construction phase, and post-storm inspections and maintenance
 - Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives
 - Implementation of monitoring plans for road stability, drainage, and erosion control
 - Mitigation plan for road failures
 - Restoration design for each road not needed for future management activities
 - Maintenance plan for each road needed for future management activities
2. To avoid sediment delivery to streams from the road surface:
 - Outslope the roadway surface, except in those cases where it would increase sediment delivery to streams or where infeasible or unsafe
 - Route road drainage away from potentially unstable stream channels, fills, and hill slopes
3. Avoid disruption of natural hydrologic flow path.
4. Prohibit ditch drainage and road surface drainage into live streams or intermittent stream channels.

2.6.8 Wildlife Mitigation

Several mitigation measures listed under other resources also apply to wildlife habitat protection.

1. Follow Wyoming Game and Fish Department (WGFD) recommendations and treat a minimum of 1,000 acres of aspen to avoid concentrating elk use because of the nearby Jewett feedground. Treatment may occur over a 1- to 3-year period.

2. All roads need to remain closed/gated to maintain wildlife security as per the travel plan unless they are an erosion/sedimentation concern, in which case they should be rehabilitated and closed once treatments are completed.
3. Forest Plan snag guidelines should be followed.