Chapter 3

Environment and Effects

User Guide to Chapter 3

3.1 INTRODUCTION

This chapter provides information concerning the existing environment of the Kraft Springs project area and potential consequences to that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the proposed action or alternatives is described by its current condition and uses.

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with the implementation of each alternative. All direct, indirect, and cumulative effects are disclosed. Effects are quantified where possible, and qualitative discussions are also included (See also Chapter 2, and Appendix A).

3.1.1 ANALYZING EFFECTS

3.1.1.1 DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but would be significant in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. Past actions for the project area date back to 1988 because most of the activities prior to that date were burned over during the 1988 Brewer Fire. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.2 FIRE AND FUELS

3.2.1 INTRODUCTION

Fire seasons experienced in recent years illustrates the fire hazard existing on a majority of forested lands throughout the West. Fire exclusion during the past 75 years has caused uncharacteristic changes in vegetation, stand structure, fuel loading, and surface fuel continuity. Fires have quickly grown in size, heat intensity, and severity. Undesirable changes are occurring with forest species composition and site productivity. Threat of damage or loss of natural and cultural resources has increased. Fire suppression costs have soared. Safety for firefighters during suppression activities has become a major concern and in some cases has resulted in fatalities.

While the fire regime for western forests are described as mixed, the relative proportion of fire types has shifted. High intensity, high severity fires are more likely to occur over more of the landscape than they would have historically. These changes threaten long-term resiliency, integrity, and sustainability of the forest. Attainment of future conditions and goals outlined in Forest Land Use Plans are uncertain. To add to the complexity, communities have grown within these forested situations, increasing the risk of firefighter and public safety, home loss and/or property damage, higher costs, and resource value lost.

3.2.2 FIELD SURVEYS/RESOURCE CONTACTS

Field surveys for this project were in the fall of '02, along with utilization of stand and fuel data collected from the area prior to the burn (fall of '01 and spring of '02). Consultation with Fire Management Officer Jerry Matinez, other district resource specialists, and review of appropriate management documents pertaining to the area has been an on-going process.

3.2.3 FIRE HAZARD AFFECTING KRAFT SPRINGS FIRE

The 2002 Kraft Springs Wildfire affected previously burned and planted areas within the 1988 Brewer Fire, and large areas of mid-older age forested stands within the Long Pines Land Unit (See Appendix A, Map 1). Due to the age and size of the newly established regeneration within the Brewer Fire, a high percentage suffered mortality. Existing surface fuel loading and the fuel ladder-effect stand structure in the mid-older age forested stands contributed to a high intensity, stand-replacing burn with extensive stand mortality.

The Kraft Springs Fire ignition originated within the 1988 Brewer Fire perimeter. Extensive grass vegetation had established over the Brewer Fire area, along with intermittent areas of heavy fuel accumulations of large size surface fuels resulting from the Brewer Fire. Existing surface fuel accumulations served as a source of extreme heat intensity, which facilitated convective development, increased air drafting, and resultant rapid fire spread. Local topography and normal prevailing winds also accelerated the fire behavior, resulting in fire spread reaching the higher elevation plateau topography. Topography alone would influence fire spread reaching the higher plateau area in spite of these heavy fuel accumulations, but not as a high intensity fire front, over a wide area. Existing fuel accumulations added to the heat intensity and particularly the development of firebrands and spotting fire behavior ahead of the fire front.

Additional heavy surface fuel accumulation, some partially decomposed, on the plateau area continued to ignite, perpetuating the high heat intensity within the flaming front of the fire. These fuel accumulations were readily susceptible for easily ignition and quick fire development. The high heat intensity caused minor erratic fire behavior, resulting in firebrands with short distance spotting ahead of the fire front. Extreme fire weather conditions had existed for some time, thus spot fires quickly developed. Additional spot fires, intermittent heavy ground fuel accumulations, along with a high heat intensity fire spread, magnified the difficulty/resistance of controlling the fire. Without these heavy surface fuel loadings, fire spread would most likely have remained as a surface spreading fire, capable of being contained by a ground fire crew(s) at the upper end of the slope near the plateau.

3.2.3.1 PURPOSE & NEED

Scientific ecological assessments indicate that fire, at some scale and frequency, is necessary in the development and functioning process of many forest and rangeland ecosystems throughout the Western United States. These same scientific ecological assessments point to the fact that natural ignitions will occur. Whether these ignitions become manageable fires without causing adverse resource effects greatly depends on the existing fire hazard.

Current Fire Management Policy emphasizes the need to “manage with fire” instead of attempting to “manage against fire.” Strategies outlined in the National Fire Plan recognizes fire as part of the ecosystem and focuses on hazardous fuel reduction, integrated vegetation management, along with fire suppression activities. The topic for a recent National Fire Plan Briefing Paper emphasizes the need for analysis and management of fuel characteristics in order to maintain conditions that reduces the risk of fire behavior experienced in recent years (November, 2002). The Kraft Springs project recommends fuel treatments now, as the strategy to lessen undesired fire behavior risk and provide a situation to achieve a gradual reintroduction of fire as a safe and management tool in future natural resource management.

> **What is Fire Hazard? ---** Hazard refers to the fuels. Measurable items for rating fire hazard are rate of spread and resistance to control. If a fire spreads rapidly or is difficult to control, the hazard is rated as high; but if a fire spreads slowly or is easily controlled, the hazard is low. (Mohr, 1971, Master’s thesis, Oregon State University)

The Kraft Springs Fire has set the stage for a potential fire hazard similar to the 1988 Brewer Fire. A heavy loading of large size fuel, over a contiguous area, is expected from stands that experienced a moderate to high intensity burn during the Kraft Springs Fire. An objective of this project is to treat fuels associated with the dead and dying fire-killed trees, to prevent a future high or extreme fire hazardous situation. Future wildfires will have the potential to be large, more intense, and severe. Estimated 1,000-hour size (wood > 3" diameter) fuel loading at the ground surface five to ten years after the Brewer Fire, was approximately 32 tons per acre[1].

The proposed fire hazard project is a long-term fuel management strategy, providing a margin of safety for forest workers, firefighters, visiting public, as well as achieving forest sustainability. Fuel removal in sufficient quantities by harvest or other means, along with modification of remaining fuels necessary for forest management will modify future fire behavior. Fuel reduction will increase the margin of safety to firefighters by providing safer working conditions and minimizing the duration of suppression activities (i.e. firefighter's exposure to elements of the environment and the wildfire itself).

3.2.3.2 CONCERNS SUPPORTING THE PURPOSE & NEED

Management of post burn fuel situations now, along with continued maintenance management of the vegetation and fuels are concerns expressed during interdisciplinary discussions.

1. Heavy wildland fuel loading continuous over a large area.
2. Wildland fuel characteristics and implications for firefighter and public safety.
3. Wildland fuel characteristics and protection of wildland urban interface areas.
4. Wildland fuel characteristics and forest resources protection & sustainability.

The concern over the long-term potential for heavy wildland fuel loading over a large area is the primary management concern. The other items (2-4) are directly tied to the potential for heavy fuel loading across the landscape if no management actions are taken.

Two fire ecology terms are used throughout the following discussion — fire intensity and fire severity. The terms are related, but quite different. Fire intensity is a description of active fire behavior. Fire severity is a description of effects resulting from the fire behavior. In addition see Appendix D-1 for fire intensity/severity definitions as used by the Kraft Springs Fire BAER Recovery Report.

> **Fire intensity** refers to the rate of heat produced by a wildland fire at a point in time. Fire intensity is influenced by the amount of fuel available for burning, local weather conditions before and at the time of the fire, and the topography of the burning site. As a rule, the greater the fuel loading, the more intense a fire is likely to burn (DeBano et al 1998). While there are several ways of expressing fire intensity, fireline intensity is the most widely used. A visual indicator of fire intensity (fireline intensity) is the flame length. Fireline intensity and flame length are mathematically (empirically) related.

[1] (Based on fuel transect data taken in unburned portions of Brewer Fire by fuel management specialist Fall, 2002, and as observed by the district forester since 1991)

Fire severity refers to the degree to which a site has been altered or the successional processes disrupted by fire. Often it describes the amount of surface or soil organic matter consumed. Fire severity, is a product of fire intensity and residence time. Fire severity is generally considered to be low, moderate, or high. A light severity burn is one that leaves the soil covered with partially charred organic material. A moderate-severity burn results from a burn in which all of the organic material is burned away from the surface of the soil; any remaining fuel is deeply charred. A high-severity burn results in all of the organic material being removed from the soil surface and organic material below the surface is consumed or charred" (DeBano et al 1998).

Concern # 1: Heavy Wildland Fuel Loading Continuous Over Large Areas

Heavy loads and continuous fuels in forest plant communities that were historically shaped by relatively frequent, low intensity fires are a concern. Heavy fuel loading, continuous over several hundred or thousand acres can perpetuate a future burn of high intensity and severity. Detrimental effects could be long-term due to surface temperatures and heat duration (Wright and Bailey 1982, Albini 1976, DeBano et al 1998).

Heavy fuel accumulations can remain for a long period of time since natural decomposition is relatively slow in these cold, dry climates (Arno 1976, Habeck and Mutch 1973, Brown et al 2001). Some conditions that appear to make an area more prone to reburns are: ample fuels for large fires, large tracts of relatively contiguous downed fuels, usual prevailing winds, high lightning frequency, and prolonged drought (Barrett 1982).

The possibility of a reburn is small on any one site but is high over the landscape. Accumulations of large woody fuels, especially those in a state of decomposition, can hold a smoldering fire on a site for extended periods of time, increasing it's persistence until weather changes assist development of a higher intensity fire, increase fire behavior with possible spotting and eventual increase of fire perimeter (Anderson 1969, Brown et al 2001). Based on observations and assessment of areas burned during the 2000 fire season, Brown, et al, concluded that effects of a future burn (reburn) during high to extreme burning conditions in areas that originally burned at a moderate to high severity is as follows:

- 0-10 years after a fire: Severe fire is unlikely because large woody fuels will still be accumulating and there will not be enough decay to support prolonged smoldering combustion.

- 10-30 years after a fire: Most of the large woody fuels will have fallen down, with some decay to support prolonged burning. A duff layer will not be well established. High severity burns will primarily occur where large woody material was lying on or close to the ground. High severity burn could be substantial where a large portion of the soil surface was directly overlain by large woody pieces.

- 30-60 years after a fire: Large woody fuels will have considerable rot and a duff layer may be well established depending on the amount of overstory conifer. More severe burning is possible, depending on extent of soil coverage by large woody pieces. If a conifer overstory is present, crowning and burnout of the duff could amplify the burn severity.

In areas designated for managing timber resource as a primary land use, reburns can have severe negative ecological and economic consequences. Since western forests have an inherent fire regime, fires will continue shaping the landscape. However, fuel management—which involves reducing the loading of available fuels, converting fuels to those with a lower flammability, or isolating or breaking up large continuous bodies of fuels (DeBano et al. 1998, Green 1977)—is a realistic management goal. Breaking up fuel continuity can change the behavior and allow suppression forces a higher probability of successfully attacking a wildland fire (Agee et al 2000, Green 1977).

Although fuel continuity or discontinuity with its relationship to fire growth depends on current weather and fire behavior (Agee, et al 2000, Finney, 2001), its importance can be realized by looking at relative differences among different scenarios. Where the management goal is fire suppression, fuel management objective is to create a heterogeneous landscape with various opportunities for firefighters to make safe, reasonable, strategic, and tactical decisions. For example, reducing fuels in a 1-acre checkerboard across the landscape would have less of an effect than strategically placed zones of lesser fuel loads, even if the same number of total acres were treated (Agee, et al 2000, Finney, et al 1997, Finney, 2001).

Additionally, prevailing winds, slope, aspect, and values at risk drive the placement of treatment units across the landscape. It is necessary to assess fuel continuity and effects of fuel reduction on the whole landscape so that treatments have additional value. It is not possible to predict exactly when or where a fire will start, nor can it be predicted precisely how large a fire will grow. Dead and down woody fuel load hazards near communities and values at risk (such as plantations) can be assessed in a qualitative manner by studying maps indicating the relative position of values at risk in relation to the topography and projected fuel conditions.

Concern # 2: Wildland Fuel Characteristics & Implications for Firefighter and Public Safety

Behavior of a fire is influenced by several factors, all of which fall into the categories of topography, weather, and fuels. Management activities cannot influence weather or topography, but can significantly affect the wildland fuels. Fuel characteristics affecting fire behavior are vegetative density, species composition, amount of surface fuel, arrangement of fuels and moisture content (Rothermel 1983). Modifying any one of these characteristics has a direct result on fire behavior. Treatments that reduce fuel loads have been shown to decrease fire behavior (Buckley 1992). Van Wagtendonk (1996) and Finney et al (2000) and fire simulations show that a reduction in fuel loads decreased subsequent fire behavior, increased fireline control possibilities, and decreased fire suppression costs. Efficient fireline construction rates are also enhanced where fuel reduction has occurred, which decreases resistance to control (Agee et al 2000). Fuel reduction can play an important part in increasing firefighter and public safety by modifying fire behavior in the fire environment through a reduction in fire intensity and severity (Pollet and Omi 1999).

The shorter a fire's duration, the less potential exists for adverse weather changes and consequent extreme fire conditions that can affect a firefighter's margin of safety. Essentially there is less firefighter exposure to potential environmental hazards. Experience has shown that firefighters can more safely fight a fire if:

- It stays small (low rate of spread; largely determined by small fuels),
- Has lower intensities (determined by fuel structure and accumulation),
- Has relatively little spotting potential (determined by potential firebrand sources, how far they travel, and probability of ignition upon landing), and
- Low resistance to control (suppression force required to control a unit of fire perimeter; determined by amount of dead and down fuels).

Firefighter and public safety affected by fuel modifications.

Three kinds of fuels affect fire behavior: (1) fine fuels such as grass, forbs, or tree foliage (2) small woody fuels less than three inches in diameter, and (3) Coarse Woody Debris (CWD) greater than three inches in diameter. Fine fuels are the major contributors to fire spread, carrying the ignition and the flaming front of a fire (Rothermel 1983). Under a frequent fire regime it would be possible to maintain fine fuels at lower levels and various patch sizes, than under a less frequent fire regime. Lessening fine fuel loading reduces rate of fire spread. Modifying the arrangement (horizontal continuity) at the ground surface benefits the control effort, usually referred to as "resistance to control."

Large fuels (greater than 3" diameter) do not contribute greatly to fire spread, and are not considered in the BEHAVE fire spread prediction model, though they do remain burning after the fire front has passed (Andrews 1986). Large fuel amounts and state of decay contribute to fire persistence (the ability for a fire to remain burning on a site, even if current conditions are not conducive to fire spread), burnout time (the amount of time necessary to consume a piece of fuel of a certain diameter), and resistance to control (resistance to fireline construction efforts). Increased fire persistence, resistance to control, and burnout time negatively influence firefighter safety by hampering suppression actions and increasing firefighter exposure to environmental hazards. They also contribute to the development of large fires and high fire severity (Brown et al 2001).

Heavy fuel situations usually present a high "resistance to control" depending on hand line or mechanical suppression tactics. Resistance to control is the relative difficulty of constructing and holding a control line as affected by resistance to line construction and by fire behavior (NWCG 1996). Fire hazard and resistance to control reach high ratings when CWD exceed 25 to 30 tons per acre in combination with small woody fuels of 5 tons per acre or more (Brown et al 2001). However, it is the number of large pieces (>10") that largely determines resistance of control, rather than their total loading (Brown et al 2001).

When fuel accumulations occur across the landscape in large, contiguous amounts, it is problematic for suppression forces because there is no relatively "easy" place to build line—the large fuels must be removed or cut through in order to help stop the spread of fire. Often this means locating control lines ahead of the advancing fire. On the other hand being a distance from the fire's edge lessens the margin of safety for firefighters.

Hand crews are usually effective in direct line construction when flame lengths are four-feet and less (Rothermel 1983). When heavy fuel accumulations are ignited (regardless of their landscape configuration) they can have a long burnout time and can burn intensely for long periods (Anderson 1969). As they burn, can cause pre-heating and pre-drying of the overstory crown fuels. With prolonged convective heating, crown foliage and twigs can ignite and "torch," often starting additional spot fires and contributing to increased fire intensities. If fuel, topographic, and weather conditions are conducive to producing flame lengths of 8-11 feet, control efforts at the head of the fire will likely be ineffective. With flame lengths of 11 feet, a crown fire can occur in which control efforts at the head of the fire are ineffective (Rothermel 1983). Crown fires may not stop until the fuel condition or weather changes.

Results from a study with post burned forested situations on the Bitterroot National Forest indicated that reducing total fuel load of woody material greater than ten inches in diameter will be effective in reducing flame lengths, resistance to control, and crowning/spotting potential in many instances (Bitterroot Burned Area Recovery EIS, 2001, using the Fire and Fuel Extension (FFE) Modeling Program).

Lowering potential for extreme fire behavior

Extreme fire behavior implies a level of fire behavior that ordinarily excludes direct attack near the fire's perimeter. One or more of the following behavior events is usually involved: high rate of spread, flame lengths greater than eight feet, torching, prolific crowning and/or spotting, presence of fire whirls, and fully developed convection column. Spotting severely limits the ability of firefighters to confine a fire and poses some of the greatest threats to firefighter safety. The behavior becomes unpredictable because such fires often exercise some degree of influence on the environment, resulting in several flare-ups and an eventual firestorm. Heavy loading of large size fuels, observed within the old Brewer Fire area, contributed significantly to the extreme fire behavior exhibited by the Kraft Springs Fire during the first two days (observed by District personnel).

Down woody material equal to or greater than 25-30 tons per acre of is used as a threshold when discussing undesirable fire effects and fire behavior (Brown et al 2001, Rothermel 1983). However, even this fuel loading level poses several hazards (such as spotting, increased heat intensity, and high resistance to control) should an ignition occur on a day when weather conditions are conducive to extreme fire behavior—generally hot, dry, and windy.

Concern # 3: Wildland Fuel Characteristics and Urban Interface Protection

A Wildland Urban Interface (WUI) exists where humans and their development meet or intermix with wildland fuels (USDA 2000G). Fuels in the wildland environment exist in a continuum and there is rarely a distinct line between the wildland and urban environment. In addition, some WUI situations, especially on the Sioux District, exist in a remote area which is not quickly accessible by suppression forces. Residences and other property are at an imminent fire risk within a short time.

A recent study following the Cerro Grande wildland fire in Los Alamos, New Mexico indicated that the removal of fire-killed trees reduces fire behavior (Greenlee 2000). The study analyzed the change in fire danger between pre-fire fuel conditions with post-fire fuel condition. It illustrates that fire hazard is different in different years with increases in heavy and light fuels. The study concluded that the fire hazard in high and moderate intensities burned areas could be a greater threat to WUI areas during post-fire years 6-12, than the pre-fire fuel condition situation. During post fire year 6 – 12, there is heavy fuel accretion, caused by numerous fallen snags intermingled with the newly developing understory of grasses, trees, and shrubs. Before post fire year 6, there was not enough surface fuel accumulation to cause much fire behavior. After year 12 the regenerating forest began shading fuels and reduced mid-flame wind speeds.

Twenty-one years of post-fire photographs after the 1977 La Mesa fire, which burned ponderosa pine near Los Alamos, provided reliable information on fuel accumulation over time that helped verify Greenlee's (2000) study.

When fire enters a WUI area, there is high probability that firefighting resources will be deployed and members of the public may be exposed to the hazard of burning/falling snags, as well as periodic high intensity fire in areas of heavier fuel accumulations. The purpose of fuel treatments in the WUI is to provide for firefighter safety and minimize future loss of property and natural resources. Fuel treatments in and near the WUI also serve to protect National Forest lands from the risk of wildland fire spreading from private property.

Concern # 4: Wildland Fuel Characteristics and Forest Resources Protection & Sustainability

All units proposed for post fire fuel treatment are identified as timberlands in the Forest Plan. Now that the area has burned, the goal is manage and maintain future wildland fuel situations (loading, continuity) at a level that is safe for forest workers, ensures fire protection, allows ecosystem processes, and provides fire effects that are acceptable. This situation will also facilitate the reintroduction of fire as a natural disturbance and as a management tool. Without fuel management activities at this time, opportunities to maintain healthy forest stands in the future with prescribed fire use would be considerably hampered by accumulated fuels (Brown et al, 2001). Reducing the future amount of large, dead and down woody fuels increases the potential for using prescribed fire as a management tool.

Fuel treatment of dead standing fuels that will eventually contribute to future fuel loading is necessary now before regeneration occurs. It is difficult to protect reforestation investments from fire in areas with a heavy fuel loading due to higher resistance to control, fire intensity, and spotting potential. However, as large areas of heavy fuels are broken up, the risk of future loss to large fire is reduced. As pine forest types are returned to conditions in which they are more resilient to future wildfire, timber resource investments are also at lower risk.

"Fuel" is the same material as "Coarse Woody Debris (CWD)[2]. Minimum amounts of coarse woody debris are needed to contribute to sustainable ecosystem function (Graham et al 1994). Brown, et al (2001) suggests historically, that ponderosa pine habitat types had small woody fuels (less than 3 inches in diameter) averaging less than 5 tons/acre, while large woody fuels (greater than 3 inches in diameter) typically ranged from 5-20 tons per acre. After the 2000 fires, models show the large woody surface fuel loads could approach 20 tons/acre after 10 years, and up to 30 tons/acre after 30 years on some sites (Bitterroot Forest Recovery EIS).

3.2.4 NATIONAL FIRE PLAN/FOREST PLAN/OTHER MANAGEMENT DIRECTION

This project is related to "key points" addressed in the recent Briefing Paper provided by the USDA Forest Service (November 2002) regarding hazardous fuel reduction and treating vegetation in order to maintain conditions that support desirable fire behavior.

This project is a proactive approach to treat existing fuels that resulted from a wildfire before they become a situation that impairs future management practices. Treatments in this proposal along with appropriate vegetation management are necessary in order to maintain the desired fire behavior for the long term. This analysis compares fire behavior with no fuel treatment versus implementing treatments now.

3.2.4.1 CUSTER NF FIRE MANAGEMENT GOALS, STANDARDS & GUIDELINES:

Management of wildland fire (suppression, prescribed fire and wildland fire for resource benefits) is addressed in the Custer National Forest Land and Resources Management Plan. The Plan's direction, standards, and guidelines are consistent with current National Fire Policy. At this time the appropriate management response for wildland fire ignitions in the Long Pines Land Unit is suppression and prescribed fire use. Wildland fire use for resource benefits may be an opportunity in the future, once fuels and vegetation in the area are being treated on a maintenance schedule.

The following goals, standards and guidelines are a combination of those found at all levels of the Fire Management Program: national, regional and forest.

[2] CWD is woody material > 3" diameter.

- Human life (firefighter and public safety) is the highest priority with fire management activities. Property, natural and cultural resources are lower priorities.

- Ecosystems are restored and maintained, consistent with land uses and historic fire regimes, through wildland fire use and prescribed fire.

- Maintain fire suppression capabilities that are able to implement appropriate management response with all wildfires and consistent with forest and management area emphasis and direction.

- Reduce human-caused fires (either accidental or arson).

- Natural ignitions will be suppressed in areas not covered by an approved fire management plan. (Lands within this project area are not covered by an approved plan for natural ignitions, i.e. "Wildland Fire Use")

- Reduce hazardous fuels; utilizing the full range of fuel reduction methods is authorized, consistent with forest and management area emphasis and direction.

- Prescribed fire is appropriate forest-wide.

3.2.5 AFFECTED ENVIRONMENT

3.2.5.1 REPRESENTATIVE FIRE REGIME FOR LONG PINES LAND UNIT

Fire is a dominant ecological process on most forest and range lands throughout the Central, Northern, and Intermountain Rocky Mountain Region. The forest stands in the Long Pines land unit are composed of the ponderosa pine cover type with no other conifers present. Historical landscape level structure was fairly homogenous, primarily multi-aged, and lightly to moderately stocked. Current structural conditions are mainly mid-seral structural stages, densely stocked, with small amounts of old growth. Historically, the fire regimes were typically non-lethal and at intervals of 5-40 years. The fire-adapted species such as ponderosa pine and aspen were very common as a result of past non-lethal fires. Current fire regime has shifted to a primarily lethal fire regime and is more intense, resulting in primarily stand replacing fires[3].

Past management and fire suppression has simplified many of the stand structural conditions resulting in a more even-aged single canopy structure. Current structures are dominated by overstocked, mid-seral structural stages with large amounts of ladder fuels caused by smaller trees below the canopy. Current fire regimes include larger, more intense fires, especially in the last ten years. The historical fire regime of smaller, less damaging fires, is not occurring in the ponderosa pine cover type.

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[3] Source:FS-Northern Region Overview, 1998, pp 23-24, Ponderosa Pine Cover Type.

When fires occurred under the historical fire regime (every 5-40 years), they tended to be low intensity surface fires burning needle litter, dead branch material, downed logs, bark chips, pine cones, and low stature living plants. Varying amounts of larger overstory trees survive the fire, and patches of the stand are left unburned. The more frequent interval fires usually burn most of the smaller size live and dead fuels that have accumulated since the last fire. This frequent fire interval keeps the surface fuel loading light, and future fires of low heat intensity. Forest stands under this scenario tend to retain a long-term large tree overstory component on the site, with relatively few smaller understory trees.

When fires burn less frequently in this fire regime, they tend to be moderate to high intensity fires. This is because over time, fuels accumulate as increased surface loading and in a more continuous arrangement, both vertically and horizontally. The horizontal continuity permits a more steady spreading ground fire and the vertical continuity helps establish a "ladder effect" which can quickly transition a surface fire into the tree crowns. Tree mortality occurs either from total crown consumption or from the more intense heat of the surface fire. The overall fire behavior may result in mortality of several trees in one location, often called a stand replacement burn, or the fire may spot to another location leaving live trees in-between. It may only cause mortality of a few trees in one or each location. The end result is a forest with a mosaic pattern of forest structure, age class, and composition.

Throughout the landscape there is a reduction of the historic mosaic pattern. Past forest practices of aggressively suppressing all fires has tended to proportionately promote a situation of increased fuel accumulation, more multi-storied stands, and increased vertical and horizontal continuity. This has led to more lethal fires and more extensive areas of stand replacement type burns than historically has occurred in this fire regime area. Generally, periodic fires would remove fuels, thin these stands, and reduce the invasion of ponderosa pine seedlings in open meadow areas.

3.2.5.2 FIRE HISTORY STATISTICS

The annual average number of fires per decade in the Long Pines Unit since records have been kept is 9, and most have not been more than one acre in size. However there have been sporadic larger size occurrences. The largest was the Brewer Fire in 1988. In 1977 and year 2001 the two larger size fires were 2,860 and 1,100 acres, respectively. In 1994 there were two fires, one at 157 acres and the other at 215 acres. These statistics help support the infrequent fire regime common for Long Pines Land Unit.

3.2.5.3 WILDLAND FUEL SITUATION PRIOR TO KRAFT SPRINGS FIRE

A major vegetation cover type responsible for the fuel characteristics within the Kraft Springs Fire perimeter prior to the burn was ponderosa pine. In most cases stands were densely populated with developed a multi-layer structure, and had the potential for a high intensity fire, stand-replacing burn. The ground surface fuel bed was a fairly continuous loading of fine size fuels with a good receptive for new ignitions and accelerated fire spread. The multi-storied stand structure provided an excellent fuel ladder effect, allowing surface fire to spread into the crown layer resulting in torching and spotting fire behavior.

The Northern Forest Fire Lab (NFFL) developed fuel models that describe different surface fuel situations. Fuel models are "tools" to help estimate fire behavior. Criteria for choosing a fuel model involve assessing the fuel strata that will support the fire as it spreads and as it generates heat intensity. Where fuel beds are fairly continuous with similar fuel characteristics, one model can provide a realistic representation of expected fire behavior. Where fuel beds are less homogenous, the two fuel model concept has been designed in which the estimated fire behavior is an average of outputs from each situation, or is expressed as a range of expected spread and heat intensity (Fire Behavior Analyst Field Guide, 1991).

Fuel situations existing in the analysis area prior to the Kraft Springs Fire were best represented by NFFL Fuel Models 1, 2, 6 & 9, or some proportion of each. The following descriptions quantify/qualify the expectation that these surface fuel conditions represent before erratic fire behavior may occur, resulting in large scale, high intensity fire (Anderson, 1982).

In NFFL Fuel Model 1, the fine, very porous, and continuous grass and herbaceous fuels that have cured or are nearly cured govern fire spread. These surface fires move rapidly. Very little shrub or tree vegetation is present, generally less than one-third of the area. Fires in this model cause very little mortality in established stands and serve to limit seedling development in the understory. The natural mosaic pattern of fire allows even aged clumps of trees to form across the landscape. This fuel model represents the majority of rangeland. Fuel bed depth is one foot. Average fuel loading for this fuel model is in the following table:

Table III-1: Characteristics of Average Fuel Load in NFFL/FM 1

FUEL LOADING	TONS PER ACRE
Total fuel load less than 3-inch dead and live	0.74
Dead fuel load 1/4 inch	0.74
Live fuel load foliage	0

In NFFL Fuel Model 2, fire spread is primarily through the fine curing grass, dead herbaceous fuels, and litter. The litter is dead-down stem or branch woody from the shrub or tree over story, which contributes to more fire intensity than Fuel Model 1. Open shrub lands and ponderosa pine stands generally fit this model. These stands may include clumps of fuels or small concentrations of dead down fuels that generate higher intensities and may produce firebrands. Grasslands being encroached by conifers, as well as light understory development may be represented by this model. Average fuel bed depth under this fuel model is one foot. Typical fuel loading for this fuel model is in the following table:

Table III-2: Characteristics of Average Fuel Load in NFFL 2

FUEL LOADING	TONS PER ACRE
Total fuel load less than 3-inch dead and live	4.0
Dead fuel load 1/4 inch	2.0

FUEL LOADING	TONS PER ACRE
Live fuel load foliage	.5

In NFFL Fuel Model 6, fires carry through the shrub layer. Fire will drop to the ground at low wind speed or openings in the stand. Although this model covers broad ranges of shrub conditions, it also used to represent conditions in stands having high levels of under-story development. A portion of the mid-older age ponderosa pine stands in the Long Pines Land Unit with pockets of dense pine regeneration understory exhibit a surface fuel bed represented by this fuel model. Fuel bed depth is 2.5 feet. Average fuel loading for this fuel model is in the following table:

Table III-3: Characteristics of Average Fuel Load in NFFL/FM 6

FUEL LOADING	TONS PER ACRE
Total fuel load less than 3-inch dead and live	6.0
Dead fuel load 1/4 inch	1.5
Live fuel load foliage	0

In NFFL Fuel Model 9, fires spread through surface litter that has accumulated under more dense stands of ponderosa pine. Mature stands having small amounts of understory development often have these fuel characteristics. Concentrations of dead-down woody material will contribute to possible torching of overstory trees and spotting. Fuel bed depth is 0.2 feet. Average fuel loading for this fuel model is in the following table:

Table III-4: Characteristics of Average Fuel Load in NFFL/FM 9

FUEL LOADING	TONS PER ACRE
Total fuel load less than 3-inch dead and live	3.5
Dead fuel load 1/4 inch	2.9
Live fuel load foliage	0.0

3.2.5.4 POST BURN FIRE HAZARD SITUATION

The Kraft Springs Fire resulted in large blocks of stand-replacing wildfire in forested stands of the Long Pines Land Unit. The BAER Fire Recovery Team mapped the Kraft Springs Fire according to fire intensity and severity, however, there was no differences mapped for fire severity, therefore the discussions of the Kraft Springs Fire will focus on fire intensity. See Appendix A, Map 1, for the distribution of stands mapped as high, moderate, and low fire intensity in the Kraft Springs Project Area. Areas mapped as moderate or high fire intensity were areas where most or all of the trees were killed or dying. High intensity is where tree canopies were consumed and white ash was observed resulting in a stand that is completely black. It was caused by a high heat intensity spreading fire with flame lengths extending into the dominant tree canopy and often spreading as a crown fire. Moderate intensity burn is where most of the trees were killed, but the fine fuels (needles, small diameter branches) are still present on the trees, giving the stand a "brown" appearance. It was caused by moderate – high heat intensity spreading fire that remained at the ground surface but generated sufficient heat to be lethal for the overstory canopy. Low intensity fire is where most trees are still green and have survived the fire, however some small patches of trees may be dead with either a black or brown appearance. It was caused by a surface spreading fire that encountered scattered concentrations of heavier fuel loading in which heat intensity was lethal to the overstory or caused single-group tree torching. See Chapter 1 for photo examples of moderate and high intensity burns in the Kraft Springs Fire.

Future fuel loads on a given site are dependent on a variety of factors, including fire intensity, the amount of fire-caused tree mortality, and the size and distribution of those trees. Forest stands that burned at moderate and high intensity will result in continuous heavy fuel conditions over large areas, with an estimated 30 to 40 tons per acre, in 1-2 decades. In **high intensity** burned areas there are many continuous acres with dead standing trees or snags, which will eventually fall over and become part of the ground surface fuel layer. Presently there are very little ground surface fuels. In the case of multi-storied stands, only the bolewood and some branches on mid-size trees remain. All foliage and even some smaller size branches/twigs were consumed. The smaller diameter trees (< 3 inch) will most likely become surface fuels within the next five years. Larger size branches and even a few larger diameter trees are likely to become surface fuels within the next ten years.

In the **moderate intensity** burned areas, the dead, attached foliage will become the ground surface fuel layer within the next 3 – 5 years. Presently, very little of the existing ground surface fuels remain, and most foliage and some smaller size branches/twigs on smaller diameter trees were also consumed. Branches and occasional larger diameter trees are likely to fall over within the next 10 years. The foliage and small diameter branches/twigs as surface fuels would serve as a fire carrier if one occurred. Presence of grasses and forbs would also support fire spread. If a fire occurred, it would be an irregular shaped perimeter due to the discontinuous fuel bed arrangement.

In **low intensity** burned areas, most surface fuels and foliage with some being scorched, still remain. The scorched foliage will most likely be surface fuel within the next three years. Smaller diameter trees (< 3 inch) that were killed are likely to fall over within the next five years. Grasses and forbs that rejuvenated will contribute as part of the surface fuels.

Post Burn Fuel Model Description

During the first 1 – 5 years following the burn, ground vegetation in the high and moderate intensity burned areas will be grass and some forbs. NFFL **Fuel Model 1** will best represent the fuel bed. There is expected to be a fairly dense covering of grass since new grass growth is usually stimulated following a burn, although not continuous over the entire area. More sunlight is also available for plant growth at the ground surface. With a fire occurrence, the primary fire carrier is the fine size, very porous, and continuous fuel bed of grass, cured herbaceous plants, and small shrubs that have cured or are nearly cured by mid-fire season.

Fires would be surface fires that could spread rapidly through this type of fuel bed. In the high intensity burned areas, response of grass, forbs, and shrubs could be sparse. In moderately burned stands, some scorched needles are likely to contribute to the surface fuel bed in post fire years two and three. In the low intensity burned areas, some previous fuel components such as needles, small branch wood, and occasional shrubs still comprise a portion of the fuel bed. In places where fire spread was more extensive over the ground surface, grass, herbaceous and shrubs have resprouted and are part of the surface fuel bed. Overall Fuel Model 1 would represent a majority of the fuel bed and resulting fire behavior during these early post fire years.

Five to ten years following the burn, NFFL **Fuel Model 2** will begin to represent a greater portion of the surface fuels in the moderate to high intensity burn areas. Grass is still the primary surface vegetation and carrier for fire spread. A component of down, woody fuel includes smaller size fire-killed trees, and some branch wood will help contribute to fire spread and intensity. If shrubs existed prior to the fire, the burn will most likely have rejuvenated these species, and they will become part of the woody component in the surface fuel bed. In time a few scattered concentrations of woody fuels may occur, and will generate higher intensities and even produce occasional firebrands and possible short range spotting. For the most part, fire behavior is still a surface spreading fire but producing a little more heat intensity.

Fuel Model 2 also represents scattered areas within these stands where there is a little denser understory of regeneration. In moderately burned areas, pine needles would also contribute to fire spread. Overall fire behavior during these post fire years would be a surface spreading fire. Heat intensity (flame lengths) would be within the range expected with a NFFL Fuel Model 2 fuelbed. Surface fuel beds in low intensity burned areas would begin to appear as they had prior to the burn. In most case NFFL Fuel Model 2 or 9, or a combination of both best represented the situation.

Fuel Model 9 represents a fuel bed composed primarily of loosely matted pine needles, twigs, and branches that have fallen from the trees. Within 5 – 10 post fire years, this fuel model will represent about 50% of the surface fuel bed in the moderately burned stands. It will most likely represent a large percentage of the fuel bed in low intensity burned areas.

Scattered concentrations of larger size woody fuels, caused by wind or snow events, have potential to cause firebrands and short range spotting, but this event would be short-lived. Fire behavior generated from this fuel bed would be a ground spreading fire front, with flame lengths and rates of spread within the range that can be safely and effectively contained by ground fire suppression crews.

Fuel Model 10 represents a recovering burned area 20 – 30 years after the burn in which no post fire fuel treatments were performed. In this model fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. The fuel bed contains a heavy loading of large size fuels due insect, or fire-weaken or killed trees. High heat intensity, torching, spotting, and crowning are frequent in this situation. The resistance to control is high. Fuel bed depth is one foot and average fuel loading for this fuel model is in the following table:

Table III-5: Characteristics of Average Fuel Load in NFFL/FM 10

FUEL LOADING	TONS PER ACRE
Total fuel load less than 3-inch dead and live	12.0
Dead fuel load 1/4 inch	4.0
Live fuel load foliage	2.0

Fire Behavior Comparison Between Fuel Models

The BEHAVE Fire Modeling Program provides outputs of fire behavior expected from the various fuel models (Andrews, Rothermel, 1990). These fire behavior outputs are only based on the ground surface fuels. The fire behavior that may occur within the stand having these ground surface fuels conditions requires an additional assessment by a fire behavior specialist as to existing stand structure and other fuel characteristics such as fuelbed continuity or arrangement. This then determines expected fire behavior over time. A fire in a single-storied stand will most likely remain as a ground surface spreading fire. A fire in a two-storied stand will likely exhibit some flare-ups, torching of an occasional single tree, or possibly even torching several trees is there is a heavy concentration of surface fuels. Fire behavior in a multi-storied stand, continuous over the landscape, will most likely exhibit several trees torching and some crown spreading fire, depending on the wind speed at the time.

The Fire Behavior Analyst Field Guide (1991) provides a relative comparison of fire behavior outputs between fuel models (See Table III-6) that have been referenced for the Kraft Springs Project, using the same set of parameters: fine fuel (0-1/4 inch diameter) moisture content of 8 percent and a midflame wind speed of 5 mi/hr.

Table III-6: Comparison of Fuel Models and Fire Behavior Outputs

Fuel Model	Rate of spread (chains/hr)	Flame length (ft.)
1	78	4
2	35	6
6	32	6
9	7.5	2.6
10	7.9	4.8

3.2.5.5 DESIRED CONDITIONS (LONG-TERM FIRE HAZARD)

The desired conditions for the Kraft Springs project area is to achieve a “fire-safe” forested area which benefits firefighter and public safety, ensures long term sustainability of forest resources, and provides protection of adjacent private property. These conditions would be a low to low-moderate fire hazard rating. The following criteria were outlined in a paper presented by J. Agee, Univ. of Wash., describing conditions that constitute a "fire safe" forest:

- Surface fuel conditions that limit surface fireline intensity (flame length);
- Forest stands that are comprised of fire-tolerant trees, described in terms of species, size, and structure;
- A low probability that crown fires will either initiate or spread through the forest.

A **"fire-safe"** forest should not be interpreted as **fire-proof**. In western forests there will be wildland fire ignitions. A fire-safe forest indicates that the wildfire will exhibit fire behavior that can be managed by hand crew tactics. This can further be interrupted as meaning the fire is a surface-spreading fire, with flame lengths not exceeding 4-feet. According to fire studies and past experiences among fire suppression crews, heat intensity from four foot flame lengths is about the maximum level at which humans can safely work and be effective in containing fire spread near the flaming front of a fire.

Across the landscape, most stands would be considered as a low to the low end of a moderate fire hazard rating. In most cases the rate of fire spread would be such, that fire crews could safely use direct attack tactics and be effective in containing the spread. The rate of spread and resistance to control could be challenging however, where grass is still a major surface fuel component, such as Fuel Model 1 and 2. Fire spreads quickly in a grass situation and has been responsible for fatalities.

A fire that occurs when the fuel bed is proportionately more represent by Fuel Models 1 & 2 may not cause detrimental effects with existing natural resource values or private property, but warrants major concern for firefighter safety. As stands become older (20-30 years, plus), pine needles and woody material will add as surface fuel components. The fuel bed would still have characteristics of being loosely compacted, but the surface to volume ratio would be less than when the fuel component is primarily grass, therefore rate of fire spread would to be lower. This surface fuelbed is best represented by NFFL Fuel Model 9 and provides a more "fire safe" situation (note fire behavior exhibited by this surface fuel situation --- less fire spread, lower flame lengths). A scattered arrangement of some CWD fuels (> 3 inches) not exceeding 10 – 15 tons/acre for long-term soil productivity[4] is accepted without significantly affecting the overall fire hazard and "fire safe" condition. Major criteria are that these fuels are scattered across the landscape.

[4] See the Watershed/Soils section discussion on long-term soil productivity

3.2.6 ENVIRONMENTAL EFFECTS

Environmental effects are best illustrated when using measurable indicators to show differences between the alternatives. Based on the discussions above the two indicators that are most useful for comparisons between the alternatives and displaying how the activities move the fire hazard toward a low fire hazard and a fire-safe condition are:

Indicators for low Fire Hazard/Fire Safe condition

1. Acres of post fire stands with a long-term trend toward Fuel Model 1, 2 or 9.

2. Acres of post fire stands with a long-term trend of Coarse Woody Debris (CWD) < 25 tons per acre, with a desired range of from 10-15 tons per acre.

3.2.6.1 ALTERNATIVE #1-NO ACTION

No fuel treatments will occur on approximately 10, 890 acres, nor would there be an opportunity for removal of some material as a commercial product. The Kraft Springs Fire reduced surface fuels of all sizes within most of the fire's perimeter. Presently fire hazard is low, but through the course of vegetation succession, fire hazard will increase. Grass and herbaceous fuels will increase as these areas regenerate. The vegetative response will be variable according to the burn intensity, effects, rate of regeneration growth, and weather.

Within the next two decades there will be an increased proportion of the burnt landscape exhibiting characteristics outlined in Fuel Model 10. Dead/dying standing trees (ponderosa pine in all size classes) will contribute to surface fuel loading, more heat intensity and in some cases, extreme fire behavior. Difficulty of containing the fire spread increases for fire crews.

Future prescribed burns will be more complex and costly due to increased fuel loads. In most cases, they will be impractical to do. Future loading of larger fuels will have significant impacts to air quality in the event of a wildfire. Standing dead snags and the expected duration of suppression effort will lessen firefighter safety. The long-term effect of creating ecosystem conditions that are more difficult and costly to treat will limit the restorative processes such as prescribed fire. Re-introduction of fire as part of the process in development and maintenance of these fire regime ecosystems would not occur. The longer the system evolves without the benefit of fire processes the more likely the high intensity burn cycle will be repeated.

Within the next 10 – 15 years the regeneration will develop into a fuel situation resembling a NFFL Fuel Model 6, a dense shrub fuel bed. This fuel model shrub component fueled by the excessive dead and/or down component can produce some extreme fire behavior such as firebrands and short distance spotting. A re-occurring fire with increased heat intensity in areas already void of organic and duff layers would result in undesirable levels of soil heating, loss of productivity, and possible soil erosion effects.

The potential exists for a future damaging wildland fire in 1-2 decades. Direct effects include increases of surface fuel loading particularly larger diameter material. These fuel characteristics are conducive to high resistance to control. Wildland fires in this fuel situation are usually difficult and costly to control unless there is a change in weather or fuel conditions. Usually the high intensity causes extensive consumption of the organic and duff layers, and undesirable levels of soil heating and probable productivity loss. The greatest degree of wildland fire potential risk exists with this alternative. Prescribed fire use would become increasingly complex and costly. Other indirect effects include continued high suppression costs.

Heavy Fuel Loads Over the Landscape

In areas burned with high intensity fire, large expanses of heavy downed fuels were reduced along with the other surface fuel components. In the low to moderate intensity burned areas, a third to a half of the surface fuels remain. The ladder-fuel effect is still part of the stand structure in low intensity burned areas. It is reasonable to assume that in the low intensity burned areas, live trees have been stressed are susceptible to bark beetle attacks in the near future. Some of these trees could add to the surface fuel bed in the next 10 – 30 years. Over time extensive portions of the landscape will have a heavy fuel loading with a greater portion of the fuel component being larger size diameter CWD fuels (3 – 12 inch+), as portions of or the entire fire killed tree falls over. An ignition that occurs will have ample supply of woody material for heat intensity, larger flame lengths, convective heat column development, probable erratic fire behavior, eventual increase fire size, and a possible firestorm event. A fire operating under it's own environment will spread over large landscapes regardless of existing fuel situations. Areas that normally would be barriers for fire spread or fuel situations that would only generate low intensity burns are vulnerable for intense heat and unpredictable fire spread. The end result is a stand/vegetation replacement burn, setting-back burned areas to earlier seral stages of plant succession. This alternative would not reduce CWD fuel loads from an estimated 30-40 tons per acre in 1-2 decades. Ground surface fuels would resemble Fuel Models 6 or 10 during the next two decades.

Table III-7: Alternative 1, Indicators of Fire Hazard/Fire Safe Conditions

Indicators of Low Fire Hazard		Indicators of High Fire Hazard	
Fuel Models 1, 2 or 9	CWD of 10-15 tons/acre	Fuel Model 6 and Fuel Model 10	CWD > 25 tons/acre
0.0 acres	0.0 acres	10,890 acres	10,890 acres

Firefighter and Public Safety

High intensity burned areas resulted in continuous acres with dead standing trees or snags. Snags pose a great safety hazard to forest workers, visiting public and firefighter. They fall any time without warning.

Resistance to control at the present time is fairly low since majority of surface fuels were consumed in the fire. Reduced surface fuels will result in lower fire intensities, lower potential for extreme fire behavior, and fewer receptive fuels for ignition through spotting. A lack of canopy fuels has substantially eliminated an occurrence of torching behavior for the next five years or until regeneration becomes established. Should a surface fire originate, snags often facilitate firebrands that cause short and long range spotting. However, snags will begin to accumulate as part of the surface fuel bed within the next five years. The increased fuel loading of larger size fuels will add to an increases resistance to control during suppression.

In the immediate short term, the rate of spread is low due to a lack of surface fuels. The potential exist for faster spreading fires within the next 2 – 5 years since grass usually responds well after fire and most likely will be continuous over much of the area. In moderate intensity burned stands, fine fuel will increase during the next 2 – 5 years as scorched needles and branches fall to the ground surface. Fire spread will be a ground surface spreading fire. Dead standing trees, although less in number, still pose a safety hazard for forest workers, public, and fire fighters.

Wildland Urban Interface Protection

All fire intensities occurred adjacent to the WUI areas. Overstory trees in the high and moderate intensity burned areas are dead or dying. Surface fuels in all size classes (litter, duff, grass, 0-6” woody material), were mostly consumed, and burned, and large logs (greater than 6”) were consumed. There will be a slow accumulation of woody fuels over the next five years Grass and herbaceous plants should be prominent over the area. They will serve as the primary fire carrier when they cure or as surface fuel accumulation. Eventually dead standing trees of all diameters will fall and become a component of the surface fuel bed and fire hazard within the vicinity of the WUI’s will increase.

The amounts of dead or dying trees within/adjacent to the WUI’s are a high safety risk within the next 3 – 5 years. Residents only need to walk a short distance to be vulnerable as victims of a fallen branch or the dead tree. Wind is frequent in this area.

Forest Resource Protection and Sustainability

All levels of fire intensity occurred, although a majority of lands classified as suitable for timber management were affected by moderate or high intensity burns. Most surface fuels were consumed, although the duff layer remains in places. Larger size fuels to serve as woody material for long-term site productivity are void. The forest floor is in need of some woody and plant material for surface covering and site development. Grass and forbs are the primary vegetation and at this time will serve as the initial stages as a ground surface mantle. Conifer needles and small diameter branch wood not consumed in the fire will be components of the surface fuel bed within the next five years. Some dead standing trees of various sizes will become part of the surface fuel bed within the next few years – depending on wind and other environmental factors. More larger diameter fire-killed trees will eventually fall over and contribute to the total fuel loading within the next 10 – 20 years (Harrington 1996).

In the long-term, heavy fuel loads will accumulate along with new reforestation. The surface fuel situation will make future protection from fire more difficult. An ignition could quickly develop a flaming front, and exhibit rapid spread because of the grass fuel bed. Torching of some regeneration, and short range spotting is likely. Because of the accumulation of large size fuels (greater than 6 – 9 inches), resistance to control of a wildfire will increase. In the long term, areas suitable as timber resource land would be at risk for high intensity stand replacement fire and are an economic loss.

Heavy fuel loads would render prescribed fire implementation difficult. Where low to moderate fire intensities burned in the dry forest type, green trees still remain. Additionally, dead and live trees still have dead needles on them. Surface fuels were consumed in different patterns. Areas burned with low to moderate intensities still have continuous fine fuels in places as well as an accumulation of fire-killed needles and branches and large woody fuels. In some small areas, conditions are as those of high intensity fires, but in others, there was less consumption of the smaller material and soil organic matter. Where fires left dead needles on trees, these needles will fall within 3 years and accumulate. In some places fuel loads are still too high to allow safe and efficient use of prescribed fire, while other areas have enough reduction in surface and ladder fuels that prescribed fire could safely and effectively be used now. In areas experiencing strong wind events during and immediately after the fires, many trees were blown down and are currently part of an increased dead and down woody fuel since the fires burned.

Fire Hazard With Newly Established Regeneration

Under Alternative 1, only natural regeneration would occur, and no planting would be done. Alternative 1 would result in approximately 6,080 acres of immediate natural regeneration, and approximately 16,140 acres of delayed regeneration (due to lack of natural seed source).

The newly established regeneration will become more vulnerable for fire damage or mortality during the next 2 – 3 decades as the existing dead, standing trees add to the surface ground fuels. Grass that already established is still expected to be the primary fire spread carrier, but the fires will have potential for more heat intensity, possible fire brand development, spotting and increased fire spread and size. The resistance to control will also have increased significantly due to the increased loading of larger size fuels.

If stands were not dense and there was some spacing between trees, there is a greater chance for tree survival during a surface spreading fire. However even without wind, some portion of the stand will torching since grass is continuous fuel bed throughout these stand. In places where the fuel is less or the fire is lower heat intensity, some of the larger size saplings should survive.

Pre-commercial thinning or prescribed fire at the appropriate height, age or diameter would help these young stands develop into a more open, fire tolerant, fire resilient stands in the long term. Pre-commercial thinning of young plantations should lessen the fire hazard some degree since a fire is more likely to a surface spreading fire rather than one spreading through the crowns. Since grass is a continuous fuel bed throughout the new stand, a wider spacing between residuals will not ensure protection of the entire stand but should help. Grass fuel bed (similar to Fuel Model 1) can produce sufficient heat to cause cambium damage and tree mortality. However wider spacing between residual should help dissipate the heat.

3.2.6.2 ALTERNATIVE #2 – PROPOSED ACTION

This alternative proposes fuel treatments on 10,890 acres that would reduce future ground surface fuel loading and substantially reduce or eliminate high intensity fires during the initial stages of an ignition. An array of fuel treatments is recommended, from commercial salvage to noncommercial felling and piling of trees. The objective is a “fire safe” forest with a remaining fuel level that meets forest standards/guidelines for large wood debris and future soil productivity, and wildland habitat needs. The long-term effect of including harvesting/removal of large woody fuels over a large area is subsequent reduction in fire hazard by reduced heat intensity, resistance to control and threat against firefighter and public safety.

The Kraft Springs fire reduced all sizes of surface fuels in the moderate and high intensity burned areas. These areas are extensive across the unit, encompassing approximately 16,050 acres. Grass and herbaceous fuels are expected to be stimulated by the burn, will serve as the primary surface fuel bed for the next decade and will increase in loading in all areas that were affected by a moderate or high intensity burn. The response could be variable according to the burn intensity, rate of regeneration and growth, and weather. Some dead/dying trees will be left standing to meet snag habitat needs and eventually serve as recruitment biomass for coarse woody debris (soil productivity). These woody fuels, combined with the fine herbaceous fuels would pose a low fire hazard should a fire occur. The 2 – 6 snags per acre will be a safety concern for firefighters, but can be mitigated by usual safe practices employed by firefighters during suppression activity, i.e. constant alertness, designated individual as a look-out for the crew.

A short-term fire hazard may exist in the moderately – low intensity burned areas, until the slash from the commercial and noncommercial units are treated (usually within a year or two of formation). Fine fuels such as newly stimulated grass, some herbaceous and shrub plants, and needle drop from conifers will facilitate fire spread, but heat intensity will be low and resistance to control very low. At the expected rate of fuel buildup, it would take many years to accumulate surface fuel bed levels and multi story stand structure that existed prior to the fire. Reducing the large size fuels will decrease fireline intensity (flame length), but the increase in fine fuels that were naturally stimulated by the fire will increase over time, continuous over the landscape and generate fast rates of fire spread. Rate of spread could be lessen some as retention of fuel moisture in newly stimulated grass/forbs is expected to remain with the plants for a longer period of time as compared to older grass, forbs and/or shrubs. It will act as a heat sink and lessen fire growth and intensity. The naturally regenerated or planted trees will be vulnerable. Should a fire occur while the stand is still young (2 – 3 decades), mortality could be high. Later in the stand’s age the effects of a fire on existing trees will be minimal or nil.

Follow-up maintenance treatment of prescribed underburning is intended to result in a mosaic of treated and untreated areas across the landscape. Fire spread should be sporadic due to the natural occurring growth of new vegetation and fuel accumulations. This heterogeneous fuel bed provides for differences in the fire behavior that may occur. Rate of spread and fireline intensity (flame length) will likewise be different and will permit less resistance to control in spite of a continuous fuel bed of fire size fuels such as grass. Since it is not known exactly where or when a fire may start, having a strategic pattern of fuel treatment patches can provide more options for fire suppression forces (Agee, et al 2000, Finney, 2001).

Heavy Fuel Loads Over the Landscape

Reduction of dead/dying standing trees over extensive areas will lessen the potential for extreme fire behavior over the next several decades. Without removal now, they will become a major component of the fuel bed, a major contributor for increased heat intensity, possible firebrands, and spotting. Fire size could accelerate within a short period of time resulting in the fire developing and behaving on it's own environment. A high intensity stand replacement burn could be the consequent over a large area of forested landscape.

Reduced heavy surface fuel accumulations will lower the potential for fires to persist or "stay hidden" for a period of time and then quickly "coming to life" a few days later as weather changes. Once discovered, fire size, intensity, and behavior could cause high resistance to control for suppression forces.

Fuel treatments and removal of larger size fuels will provide a more heterogeneous fuel bed, breaks in fuel continuity, and provide a greater array of strategic and tactical options for firefighters to contain wildland fires in both the short and long term. This alternative would reduce CWD fuel loads from an estimated 30-40 tons per acre to an estimated 10-15 tons per acre. Ground surface fuels would resemble Fuel Models 1, 2 or 9.

Table III-8: Alternative 2, Indicators of Fire Hazard/Fire Safe Conditions

Indicators of Low Fire Hazard		Indicators of High Fire Hazard	
Fuel Model 1,2 or 9	CWD of 10-15 tons/acre	Fuel Model 6 and Fuel Model 10	CWD > 25 tons/acre
10,890 acres	10,890 acres	0.0 acres	0.0 acres

Firefighter and Public Safety

By removing dead standing trees there would be fewer snags on the landscape to pose safety hazard to forest workers, firefighters, and visiting public. Reducing dead standing trees that would eventually accumulate as a component of the fuel bed increase firefighter safety by lowering potential fire intensity, spotting, fire persistence, and resistance to control. Breaking up the large expanses of heavy fuels at the ground surface would give firefighters more strategic and tactical options, increasing their success and safety. With less fuel, especially larger diameter size lessens fire intensity and overall resistance to control. Prescribed fire can more easily and safely be implemented.

A wildfire that occurred would be low resistance to control unless it occurred in the area designated as delay treatment. Dead, standing snags could pose a challenge with spotting, and definitely would be a safety concern for the firefighters.

Wildland Urban Interface Protection

Reduction of larger diameter fuels and number of snags will lessen future fire intensity, behavior, resistance to control, and consequently improve protection for the urban interface area and residents. On-going fuel treatment maintenance will keep the surface fuel bed at a level that will result in low rates of fire spread, and thus provide a greater margin of time for suppression forces to arrive on the scene and contain the fire.

Following fuel treatment the ability to use prescribed fire as a future effective, inexpensive management tool will be enhanced. The risk escape is very low. Protection of residents and their property will be secured well into the future.

Forest Resource Protection and Sustainability

Reduction of larger size fuels and on-going maintenance of the surface fuel bed will enhance protection of the timber resource and reforestation investment throughout the stand's rotation. Treatment of fuels during intermediate harvest entries can be more easily and inexpensively treated with less damage to residual than if the larger size fuels were a component of the surface fuel bed. Should a fire occur, the behavior would be of lower intensity, less potential for spotting and overall less resistance for control.

Both size of area burned and cost for suppression should be substantially reduced. Future wildfires would primarily be ground spreading surface fires. This alternative would provide more management options for appropriate management responses with wildland fire ignitions, including the possibility of wildland fire use if desired.

Fuel loading and surface fuel bed continuity will more closely approximate historic levels, improving potential for fire protection and long-term sustainability. Application of future prescribed fire can be safely and effectively implemented with achieving desired effects for the stand and timber resource value.

Fires that occur in these treated stands would be more similar to those of the past that exhibited lower heat intensity with little detrimental effect especially soil concerns. The smaller size ground surface fuels are consumed and some smaller diameter seedlings and saplings, thus perpetuating and maintaining a more appearing pine stand. Although small islands of dense forest could remain, it would not be extensive over the landscape.

Fire Hazard With Newly Established Regeneration

Under Alternative 2, natural regeneration would occur on approximately 6,080 acres of immediate natural regeneration and approximately 8,270 acres of delayed regeneration (due to lack of natural seed source). Planting would occur on 7,870 acres.

Although the newly established regeneration will be vulnerable for fire damage or mortality during the first 2 – 3 decades, the heat intensity of a fire would not be great as one that occurred with the surface fuel bed conditions of alternative 1. The fire killed trees would either have been removed or disposed during the proposed fuel treatments, prior to planting or natural regeneration establishment. The fire-spread carrier with alternative 2 would primarily be grass. Surface fuels larger than three inches diameter would be limited to a scattered arrangement of various lengths intentionally left to meet the CWD objective. The heat intensity would increase slightly as fire spread encountered some of these larger size fuels, but not to the magnitude as possible with alternative 1. The resistance to control factor with the alternative two-fuel bed situation would still be low.

If stands were not dense and there was some spacing between trees, there is a greater chance for tree survival during a surface spreading fire. However even without wind, some portion of the stand will torching since grass is continuous fuel bed throughout these stand. In places where the fuel is less or the fire is lower heat intensity, some of the larger size saplings should survive.

Pre-commercial thinning or prescribed fire at the appropriate height, age or diameter would help these young stands develop into a more open, fire tolerant, fire resilient stands in the long term. Pre-commercial thinning of young plantations should lessen the fire hazard some degree since a fire is more likely to a surface spreading fire rather than one spreading through the crowns. Since grass is a continuous fuel bed throughout the new stand, a wider spacing between residuals will not ensure protection of the entire stand but should help. Grass fuel bed (similar to Fuel Model 1) can produce sufficient heat to cause cambium damage and tree mortality. However wider spacing between residual should help dissipate the heat.

3.2.6.3 ALTERNATIVE 3

This alternative proposes fuel treatments similar to Alternative 2 except the removal of larger size fuels as a commercial product would not occur. The vulnerability and effects associated with the fuel bed situation possible with alternative 3 would be similar to alternative 2. Most woody biomass would be disposed by burning either at a designated location or on-site. Direct and indirect environmental effects are the same (see table below) as outlined for Alternative 2, except those related to harvesting activities.

Table III-9: Alternative 3, Indicators of Fire Hazard/Fire Safe Conditions

Indicators of Low Fire Hazard		Indicators of High Fire Hazard	
Fuel Model 1,2 or 9	CWD of 10-15 tons/acre	Fuel Model 6 and Fuel Model 10	CWD > 25 tons/acre
10,890 acres	10,890 acres	0.0 acres	0.0 acres

3.2.6.4 SUMMARY OF EFFECTS OF ALTERNATIVES 2 AND 3

Both alternatives 2 and 3 affect the largest area of the post-fire burned landscape. Treatments would occur in both alternatives on approximately 10,890 acres and move those acres toward a long-term fuel model 1, 2 or 9 conditions, with a CWD fuel loading of 10-15 tons per acre. These conditions are considered to be a low fire hazard situation. Treatment of larger size fuel now helps prepare the area for future treatments using prescribed fire. These surface fuel situations represent the historical norm for southeastern Montana ponderosa pine stands. The immediate short-term effect is that fire fighter safety will be enhanced. On-going maintenance of the fuel situation will continue to influence fire behavior, giving fire fighters an increased margin of safety during suppression activities.

The most positive long-term effect for the Long Pines Land Unit is the removal of future heavy fuel loadings resulting in a lower fire hazard rating and lower resistance to control. These treatments along with scheduled maintenance burns will help return the area to a naturally occurring fire regime. Future management of fire during the next entries will be less costly and less complex.

3.2.7 CUMULATIVE EFFECTS

Cumulative effects include an analysis of fire/fuel effects for the entire Long Pines Land Unit with respect to past, present, and reasonably foreseeable future actions. This portion of the district is located within almost entirely within Montana. Being an isolated forested unit, surrounded by privately owned prairie grassland, the entire unit is potentially affected directly and indirectly by this proposed fuel treatment project. The best professional estimate, is that the combined end-result cumulative effect on this unit when considering the proposed project along with past, present, and reasonably foreseeable future actions is expected to be positive in accomplishing a more “fire safe” forested condition. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.2.7.1 PAST ACTIONS

The time frame selected for this cumulative analysis is from 1988 till present. A reason for this period of time is that the Brewer Fire that covered approximately 45,000 acres of forested lands affected an extensive portion of the unit in 1988. Nearly 24,498 acres was a stand replacement type burn and around 19,876 acres was mixed intensity, mostly as a ground surface spreading fire. Grass, pine needles, and some woody fuels were the surface fuels in the area where the Brewer Fire was a surface-spreading fire. Some pine seedlings and saplings have established but not to the extent of creating a multi-story, fuel ladder effect for fires that have occurred. Most of the low intensity burned area of the Kraft Springs Fire occurred in the previous low intensity burned area of the Brewer Fire. Majority of overstory pine trees are still alive.

In areas of the Brewer Fire affected by a stand replacement burn, grass and newly established ponderosa pine saplings were the existing vegetation. Grass fuels primarily serve as the main carrier for the fire. Some fire-killed trees were still standing, but most had fallen over and were in some stage of decomposition. They had been observed as a problem in achieving quick containment of fires that occurred in the past within the Brewer Fire area. They were a source of increased fire persistence, added to the mop-up task and suppression costs.

Fuel treatments that occurred with timber harvesting activities in the previously forested areas of the Kraft Springs Fire perimeter dozer piling and burning (31 acres) and lopping and scattering (approximately 2762 acres). In other portions of forest/grassland communities of the Long Pines Land Unit, prescribed underburning was performed on approximately 2990 acres prescribed burning for range improvement was done over 360 acres, primarily in grassland communities.

3.2.7.2 PRESENT ACTIONS

Some thinning fuel treatment with prescribed fire has occurred and will be continuing over approximately 4,000 acres encompassed by the South Snow Creek and Latham Well projects. These projects will lessen the fuel ladder effect in some scattered and/or isolated multi-storied stands surrounded by grasslands, and reduce existing dead grass/forbs and small diameter size woody fuel accumulations. Rejuvenation of grass species is expected over a majority of the acres involved.

3.2.7.3 REASONABLY FORESEEABLE FUTURE ACTIONS

The primarily activities planned throughout the Long Pines unit during the next five – ten years are additional acres effected by the South Snow Creek and Latham Well thinning and prescribed fire fuel treatments. Approximately one half of the area planned for activity in the South Snow Creek and Latham Well projects still needs to be implemented.

3.2.7.4 SUMMARY OF CUMULATIVE EFFECTS:

Since lightning is part of the natural regime for these ponderosa pine forests, management of fire ignitions (risk) is limited. However proactive management of the wildland fuels and vegetation can be effective. As more land is returned to historically documented fuel conditions similar to NFFL Fuel Models 1 and 2 with patches of Fuel Model 9, the chance of single point ignitions (lightening) spreading from the ground fuels into the canopy are reduced. With the increase of a grass component throughout the forested stands, fires could be expected to spread rapidly. However, heat intensities would be much lower resulting in minimal mortality. Residence time would be shortened and effects of soil heating reduced.

Over time with completion of the proposed project along with past and existing activities, the Long Pines Land Unit should be a more fire safe situation. Ground surface fuels within the ponderosa pine stands will more closely resembling the fuel loading and fire behavior exhibited by Fire Behavior Fuel Models 2 and 9. On-going practices such as thinning and prescribed underburning should adequately manage the vertical fuel continuity (fuel ladder effect) as the new-forested stand develops, and significantly lessen the likelihood of extensive, high intensity, stand replacement fire behavior.

There will still be fire ignitions, but the suppression capability will have increased as a result of less resistance of control, lower fire intensities, and result in more surface spreading fire behavior. In most situations the flaming front of the fire is not expected to exceed four-foot flame lengths, allowing hand crews to safely and effectively contain fire spread when necessary using direct attack tactics. The wildland fuel situation throughout the unit should approach a level where eventually wildland fire could be used to accomplish resource benefits. Lower intensity wildfires that occur along with the use of prescribed fire should enhance the hardwood component species and add to increased vegetative diversity throughout the unit. Eventually the entire Long Pines Land Unit should move to a fire regime more in equilibrium common to this area.

A mosaic of different fuel characteristics (size, loading, continuity) that occurred naturally would be sufficient to limit overall fire hazard. Suppression efforts, and the negative effects from suppression activities e.g. dozer line, could be minimized. Opportunities to protect private property, natural resource values, and urban interface situation would be increased. As more area is treated strategically the potential for smoke production would be lowered by both the decrease in potential for large scale, high intensity wild land fires and in the lessened amounts of consumable biomass remaining.

The Custer National Forest uses some prescribed fire annually. The Forest Plan recognizes that "The Forest has the potential to substantially increase the use of prescribed fire as an effective management tool in such area[s] as fuel treatment, pine colonization in grassland ecosystems, forage improvement, vegetation management in wilderness, timber management, wildlife habitat improvement, and ecosystem diversity." The probability of implementing prescribed fire activities in the affected Kraft Springs Fire area is severely limited unless fuel treatments are implemented now as a means of managing future fuel situation. Activities to treat and prepare the area for prescribed fire would produce desired results and benefits are outlined in the proposed action (Alternative 2). Fuel treatment activities at a later date would be extremely costly, damaging to the new developed stand, and involve multi-stage treatments. In addition, the fuel component would already be accumulating at the ground surface. Fire hazard would already be increasing since the large size fuel would be causing a higher resistance to control during suppression and prescribed fire activities. A long-term liability would already exist.

3.3 FOREST VEGETATION

3.3.1 INTRODUCTION

This section discusses the existing condition of the forest vegetation on National Forest System lands in the project area, including current vegetation cover types, pre-fire structure, tree densities, and fire regimes in the forested stands. The discussion addresses Kraft Springs fire burn intensities and fire effects on forest vegetation. An existing vegetation discussion as compared to historical trends is included.

This section will also describe the effects of the proposed actions and alternatives on the forest stand conditions, development stages, structure, understory vegetation health, and large woody debris on the project landscape.

3.3.2 FIELD SURVEYS/RESOURCE CONTACTS

The data used in this analysis was retrieved from four data sources; photo interpretation (compartment inventory), stand inventory, average stand conditions, and post burn aerial photography (September 19, 2002) verified with ground reconnaissance. Stand inventory occurred in 1981, 1990-1995, 1997, and 1999 – 2000. Compartment inventory was based on photo interpretation attributes of crown diameter, crown closure percent, dominant species, and tree height. Using ground reconnaissance and these attributes the stands were classified into strata according to size, stocking, species, forest, non-forest, and crown closure percent.

3.3.3 AFFECTED ENVIRONMENT – FOREST VEGETATION

Fifty-seven percent of the project area has forest cover. Of this 57 percent, 97% is dominated by ponderosa pine, 1% by aspen, less than 1% by juniper and 2% by a mixture of green ash/ponderosa pine and shrub species (woody draws). Thirty-nine percent of the project area has a grassland cover type and 4 percent by sandstone or scoria outcrop cover types.

Prior to the Kraft Springs Fire, 59% of the pine-forested acres were dominated by trees in the saw timber size class (greater than 9.0" diameter at breast height). Twenty-eight percent of the project area was dominated by crown closure greater than or equal to 40 percent (See Appendix B-2 for details of the vegetation cover types in the project area).

The project area contains land of varied topography and elevations (3,200 to 4,100 feet) with a variety of forested and non-forested plant communities. Forest cover (ponderosa pine, green ash, aspen and juniper) for the Long Pines landscape is intermingled with grasslands across the entire area. Dense ponderosa pine stands generally occur on moist, north aspects with a mix of less dense ponderosa pine stands and grasslands on the drier, south aspects and benches. Green ash occurs across the landscape in the draws. Grasslands are the dominant cover on the lower elevations along the perimeter of the Long Pines.

Appendix B-2 displays pre-fire cover type, suitability, tree size, and canopy cover percent by acres and by percent of the project area. These are data from TSMRS (Timber Stand Management Record System) from field samples and photo interpretation (compartment inventory). See planning record files (silvicultural specialist report) for a definition of classification codes.

3.3.3.1 PRE-FIRE PONDEROSA PINE COMPOSITION, STRUCTURE AND DENSITY

Lack of low-intensity fire disturbance over the last 80 years has resulted in a forest structure exhibiting increased tree density in the overstory, abundant tree regeneration in the understory, and a buildup of ground fuels (both larger diameter and litter layers) throughout much of the Long Pines Land Unit. This successional pathway has resulted in contiguous mid aged/sized tree stands that are more prone to stand replacing fire because of increased fuel loading.

Pre-fire ponderosa pine stands commonly had multistory structure. The overstory ranged from 70 to 200 plus years old, 9 to 20 inches plus in diameter at breast height, and 0 to 190 trees per acre. The mid-story ranged from 5 to 9 inches in diameter at breast height and 0 to 250 trees per acre. The understory ranged from 0 to 5 inches in diameter at breast height and 0 to 3,200 trees per acre. Board feet per acre ranged from 700 to 16,400. The drier, warmer sites represent the lower end of the range. Multistory stands were the dominant structure, with inclusions of single story stands scattered across the landscape. Approximately 6% of the forested acreage had two-story structure. These had 10 to 30% overstory crown cover and a heavy stocking of understory seedlings/saplings (500 to 2,500 trees per acre). These conditions are scattered throughout the Long Pines and are mainly a result from post 1988 Brewer-wildfire regeneration. Average stand conditions by stratum are summarized in the planning record (silvicultural specialist report).

The 1988 Brewer Fire burned in over sixty percent of the Long Pines unit of which over 24,000 acres of forested areas experienced a stand replacing burn intensity. The dense and multistory conditions that existed in the Long Pines prior to the Brewer Fire continued to exist in areas unaffected by the Brewer Fire. These conditions, combined with drought, dry fuels, and hot temperatures increases the hazard for high intensity, stand replacement crown fires. The summer of 2002 had these conditions and where dense, multi-storied stand conditions occurred on steeper slopes, the Kraft Springs fire burned at stand replacement intensities.

3.3.3.2 KRAFT SPRINGS FIRE BURN INTENSITY

Between September 6th and the 10th, 2002 BAER Team Forest Vegetation Specialist Dennis Sandbak, Silviculturist USFS- Custer National Forest, conducted field reviews of the Kraft Springs fire. Ground and aerial reconnaissance included traversing some of the affected areas and recording observations on: forest community types, species composition, burn intensity and impacts on vegetation, duff layers, topographic features, and seed sources for natural regeneration of forest vegetation. Table III-10 shows the acres and percent of FS lands affected by burn intensity. Burn intensities were mapped in the following map units based on those observations:

- Map Unit 1 –High Burn Intensity: Grasslands. Root crowns still present.
- Map Unit 2 – High Burn Intensity: Forested Lands Without Overstory Canopy. These areas experienced a high intensity fire in the 1988 Brewer Fire and were regenerating, or had successfully regenerated. Ninety percent plus mortality on the post 1988 Brewer fire plantations.
- Map Unit 3 - High Burn Intensity: Forested Lands. Greater than 90% mortality (stand replacement fire), the leaves and needles of the trees were completely consumed.
- Map Unit 4 - Moderate Burn Intensity: Forested Lands. Ten to Ninety percent burned canopy. Mosaic pattern of red-needled trees, small high burn intensity (up to 5 acre areas), intermingled with underburned areas with green canopies. Some torching of dominant and co-dominants trees, moderate to heavy scorching of overstory trees which may lead to future extensive mortality. Post-fire stand retains it's pre-burn size class but at reduced densities. Additional future mortality will change size classes.
- Map Unit 5 - Low Intensity Burn: Forested Lands. Occasional torching of dominant/co-dominant trees, light to moderate under-burning of ladder fuels and dead/down material. No significant overstory structural or density changes.

Table III-10: Forest Service Acres/% by Map Unit burn intensity

Map Unit	Forest Service Acres[1]	Percent of Forest Service Lands
1 - High Burn Intensity: Grassland	15,182	37%
2 –High Burn Intensity: No Overstory Canopy	10,174	24%
3 - High Burn Intensity	3,725	9%
4 - Moderate Burn Intensity	11,493	29%
5 - Low Intensity Burn	137	<1%
Total	40,711	

[1] Map units 2, 3, 4, and 5 include ponderosa pine, aspen, juniper and green ash cover types.

3.3.3.3 FIRE EFFECTS

Complete loss of understory vegetative cover occurred within the high intensity burn areas. However, these areas contain organic material with evidence of residual basal and root presence. In many cases some unburned organic material is present. Some "islands" of unburned vegetation remain within the moderate burn intensity areas; consumption of litter, shrubs, and understory vegetation was near complete in some of the areas due to drought conditions and low fuel moisture. Indirect tree mortality will continue for the next several years in some of the low and moderate intensity burned areas due to crown scorch, bole injuries, and retention of heat under closed canopies that resulted in root damage. These indirect effects make the individual trees much more susceptible to insect and disease attack, resulting in mortality (Forest Health Protection Report 2000-13, 2000).

Where small high intensity areas are within the moderate intensity fire an adequate ponderosa seed source is available to naturally regenerate with a high probability of success. A high probability of successful natural regeneration is also expected on the high intensity areas that are in close proximity (200 to 300 feet) of unburned areas and the moderate intensity areas. Ponderosa pine has a large seed with a wing, but is not easily disseminated by wind. However, it can be carried in updrafts and down drafts of strong thunderheads and dispersed. The western edge and central areas experienced high burn intensities during the Brewer fire of 1988 and have very limited to no seed source. These areas will require long natural regeneration periods (in excess of 100 years).

Scattered ponderosa pine saplings survived in limited areas of Map Unit 2 that will not be of viable seed bearing age for 25 to 50 years. There is a low probability for natural regeneration in the large blocks of high intensity burns. This is due to the expansive nature of the high intensity burn; limited available seed source and the topography. Because of this there could be a risk of type conversion as well as long-term ecological instability.

Woody draws containing green ash for the most part experienced moderate intensity fires. However, some were noted that were intermixed with ponderosa pine that experienced high intensity fire. These will respond well in the absence of competition and shading from a ponderosa pine overstory. Overall the woody draws experienced a low intensity burn and the expectation is to see prolific sprouting. Barring heavy pressure from livestock and big game these woody draws should recover from the fire over the next 3 to 10 years.

Aspen stands experienced low to moderate burn intensities such that there was no soil damage that was detrimental to the clone. Some appeared to have fire that acted as a thinning agent. The aspen stands will resprout and establish as a stand over the next 10 years. The nature of the fire disturbance should be beneficial for the expansion of aspen stands and woody draws and should result in sufficient forage and browse available throughout the Long Pines allowing light pressure to these systems. However, woody draws like Wickum would benefit from fencing, as cattle utilize established and new trails frequently to water sources.

Common juniper requires scarification of the seed and is dependent on bird dispersal. Juniper has expanded its historical range in the years since pre-settlement. Overgrazing, fire suppression, and climatic change have been identified as potential causes for this expansion. Adjacent unburned juniper should be adequate for reestablishment by birds and animals. There is a high probability that juniper will slowly recolonize areas in the fire, and over the next several years will probably be within its historical range.

3.3.3.4 POST KRAFT SPRINGS FIRE PONDEROSA PINE MORTALITY

The 2002 Kraft Springs fire created three types of stand conditions across the landscape: total, partial, and minor to no stand modification.

Total stand modification occurred when 80 to 100 % of the individual trees were killed or damaged to the extent they will die in 1 to 5 years (imminent mortality) due to a combination of intense ground and crown fires. Remaining live trees, if any, do not provide sufficient seed source to move toward Forest Plan resource management objectives without planting.

Partial stand modification is where less intense crown and/or ground fires occurred and had 10 to 80 % mortality or imminent mortality of individual or clumps of trees. Live trees may or may not provide adequate seed source. These areas could include 100 % mortality in areas larger than 2 acres.

Minor to no stand modification is where less than 10 % individual tree mortality and generally low intensity ground fires occurred. Adequate live trees remain and stands are considered stocked.

The following Table III-11 shows the estimated mortality classification within the Kraft Springs Fire for the Ponderosa Pine Forest Cover Type (estimates based on burned area aerial photo interpretation and field reconnaissance)

Table III-11: Mortality in Ponderosa Pine Cover Types

Mortality Type	Acres of PP Forest Cover	Percent of PP Forest Cover
Total Stand Modification	16,120	64%
Partial Stand Modification	7,050	28%
Minor or No Stand Modification	2,030	8%

3.3.3.5 SIZE OF OPENINGS

Ponderosa pine systems naturally have a mixed severity and low intensity/high frequency fire regimes. These systems also experience 10 to 15% in the stand replacement fire regime (USDA Forest Service, 1998). Due to the lack of fire or other large disturbances over the last 80 years the forested stands have developed into moderate to densely stocked, multistoried stands. With the environmental conditions of the 2002 fire season and the multistoried forest structures on the landscape, stand replacement fire were the dominant event. This resulted in the forested canopies being opened up in various sizes with some larger than 1,000 acres.

The landscape in the Long Pines prior to the fire had a diversity of forested and non-forested ecosystems. Forested areas prior to the fire comprised approximately 57% of the area and were intermingled with non-forest openings. These openings ranged from 20 to 6,000 acres and were common across the project landscape. The Kraft Springs fire removed over 40% of the forest cover with stand replacement fires. This has resulted in very extensive openings in combination with the naturally occurring non-forest openings.

3.3.3.6 COARSE WOODY DEBRIS

Coarse woody debris (CWD) is defined by Graham, et. al. 1994 as woody material greater than 3 inches in diameter. It is a major component of forests and has many functions ranging from soil protection to wildlife and microbial habitat. The management of large woody debris helps maintain ecosystem function. Snag retention is a management tool that benefits this function.

Coarse woody debris performs many physical, chemical, and biological functions in forest ecosystems. It protects the forest floor and mineral soil from erosion and mechanical disturbances and protects new seedlings from livestock damage. Coarse woody debris is a key habitat component (especially large logs) for wildlife and is important to stream ecology. Large woody debris alters airflow and provides shade, insulation, and protection for new forest growth. Ponderosa pine studies have recommended that approximately 10 to 15 tons per acre should be maintained under healthy (unburned) forest conditions (Graham, et. al., 1994).

When coarse woody debris decays it retains water, making moisture available to vegetation during dry periods. When buried in the forest floor, large woody debris is an excellent host for ectomycorrhizal root tips. Even though this debris is a small portion of the forest soil, it contains the majority of the ectomycorrhizae. Ectomycorrhizae help woody plants take up water and nutrients, and their fruiting bodies play important roles in the food chains of many small rodents and larger predators.

3.3.4 SILVICULTURAL PRACTICES

Silvicultural practices in the Forest Service Northern Region control the establishment, composition, structure, and function of forested ecosystems. Silvicultural practices must be used whenever management activities such as cutting or burning will modify forest vegetation. Silvicultural practices are employed in the management of all forest resources including timber, water, forage, wildlife, and recreation. They are based upon application of scientific knowledge and experience and are specified through silvicultural prescriptions prepared or approved by a certified silviculturalist. The planning record (silvicultural specialist report) further defines policy for silvicultural practices.

3.3.4.1 TREATMENT DESCRIPTIONS

Salvage Cutting with Fuels Treatment

Salvage cutting is one such silvicultural practice and is defined as the removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost (SAF 1998). Based on the existing condition and the Forest Plan goals and objectives, salvage cutting will best meet the Kraft Springs Project objectives of:

- Reduce existing and future hazardous fuels created from dead and dying trees.
- Recover economic value of dead and dying timber.

Dead and dying trees meeting merchantability standards would be harvested. All trees with a live crown (green) greater than or equal to 50 percent (based on the pre-fire crown length) would be left standing. In addition, logging residue and dead trees less than merchantability standards would be treated to reduce the future fire hazard. This material would be reduced to a post treatment fuel loading of 10-15 tons/acre of woody material greater than or equal to 3 inches in diameter small end, by means of machine piling, whole tree yarding, prescribed burning or a combination thereof. Un-merchantable dead trees greater than or equal to 11 inches DBH, 10 feet tall and more than 75 feet from a system road would be left standing as snag habitat within treatment areas when they do not pose a safety hazard during treatment operations.

Salvage cutting on the moderate to high burn intensity acres with total stand modification will remove the entire stand of trees, except those designated as wildlife snags or reserve trees within a delineated unit. This creates a new even-aged stand of trees. Palatable grasses, forbs, and browse may increase in ponderosa pine types from as little as 50 to 200 pounds to over 800 pounds per acre in created openings (Patton, 1987, p. 39). These acres are lost as feeding and nesting habitat for forest dependent wildlife species. If regenerated, this habitat although initially lost by the opening, will in the future (120 to 150 years) be habitat for animals requiring mature trees. Small rodents populations will increase in these openings, particularly if some slash is allowed to remain as cover. Leaving snags will allow perches for birds that prey on these rodents.

Salvage cutting in the moderate burn intensity acres with partial stand modification will remove dead trees where the fire resulted in high mortality and leave live trees (where available) as seed bearers and to provide forest cover. These trees can produce seed for natural regeneration, help maintain endemic populations of insects that are used for prey by many birds and small mammals, and could become future snags for cavity dependent wildlife.

Non-Commercial Fuels Treatment

Dead and severely damaged trees would be felled and treated to reduce the future fire hazard. This material would be reduced to a post treatment fuel loading of 10-15 tons/acre of woody material greater than or equal to 3 inches in diameter small end, by means of machine piling, whole tree yarding, prescribed burning or a combination thereof. During treatment, up to 6 and a minimum of 2 dead trees per acre greater than or equal to 11 inches DBH, 10 feet tall and more than 75 feet from a system road would be left standing as snag habitat within treatment areas when they do not pose a safety hazard during treatment operations. Preference will be given to leaving the largest diameter trees available. Treatment of these areas could begin in 2003.

Delayed Non-Commercial Fuel Treatment

Dead and severely damaged trees would be felled and treated to reduce the future fire hazard. This material would be reduced to a post treatment fuel loading of 10-15 tons/acre of woody material greater than or equal to 3 inches in diameter small end, by means of machine piling, whole tree yarding, prescribed burning or a combination thereof. Treatment of these areas, except for roadside trees, would be delayed until at least 2008 to provide habitat for snag dependent species in the short-term. During treatment of these areas, an average of 2-6 snags per acre greater than or equal to 11 inches DBH (with preference being given to leaving the largest diameter snags available) would be left standing to provide long-term habitat for cavity nesting species. The intent is to manage snag density on a treatment unit basis and not on an acre basis. Dead trees within 75 feet of system roads would be treated starting in 2003 to reduce the potential safety hazard to people using the roads.

3.3.4.2 DESIRED STOCKING CONDITIONS

A range of desired stocking conditions by growth stage were developed for the ponderosa pine ecosystems of the Custer Forest to meet resource management objectives. These conditions provide guidance related to function, composition, and structure while still meeting overall forest plan goals, and individual Management Area direction including producing timber for local markets, forage production for livestock and wildlife habitat. The desired conditions have single story, even-aged structures that promote understory forage and browse species, healthy, vigorous stands with endemic insect and disease activity and reduced crown fire risk. These conditions could be maintained through stocking reductions by either mechanical treatment or prescribed fire

The desired stocking conditions could be applied to the landscape at various size and spatial arrangements to meet the needs of wildlife, range, and timber resources by Management Area direction. Desired timber management objectives are a minimum of 200 established saplings per acre on suitable lands. To meet those objectives, initial stocking for the forested communities should be 200 to 600 trees per acre in the seedling growth development stage. Past experience on the Custer Natural Forest has shown that where seed source is adequate, natural regeneration will meet or exceed desired stocking conditions. Where seed source is not available, this process will take longer without planting. By planting approximately 400 two-year old seedlings per acre, it is expected that 200 to 400 seedlings per acre will survive and move into the next development stage. Future stand improvement activities can then be designed around the existing stocking to emulate natural conditions and take advantage of genetic gains. The planning record (silvicultural specialist report) has a more defined description of the desired conditions and development stages.

Regeneration Strategies

Regeneration strategies are an integral part of a post wildfire assessment and should consider management objectives and restoration goals. Forest regeneration establishes forest cover that helps maintain ecosystem stability by contributing to watershed stabilization, wildlife habitat cover, future seed source, and meet the Forest Plan Goals and Management Standards.

Regeneration strategies are determined by considering the site location, site conditions, and the adequacy of the existing seed source. When an adequate seed source and suitable conditions (moisture, temperature and soil) are available, sufficient natural regeneration to meet desired stocking can be expected within five years. When seed source is limited or lacking or conditions are unsuitable, natural regeneration will be delayed for longer periods of time and could take 60 to 100 years or more to meet desired stocking.

The three types of regeneration strategies are natural, delayed natural, and artificial (planting). The previously described salvage cutting can be followed by one of three regeneration strategies. This will meet the long-term desired conditions of forest cover and timelines for our reforestation policies and statutory requirements. No regeneration is planned in stands that had minor stand modification where a manageable stand still exists.

Based on the existing condition and the Forest Plan goals and objectives, these regeneration strategies will best meet the Kraft Springs Project objective of providing for the reforestation of ponderosa pine stands destroyed by the fire.

Historically, the burned forested ecosystems on the Sioux Ranger District have naturally regenerated where a seed source was available. Other areas where the site was drier and warmer may have demonstrated delayed natural regeneration. Planting has been limited to those sites where burning was so intense that adequate seed sources are no longer available. These conditions typically occurred on the more productive, cooler and moist sites. Similar conditions and strategies apply in the Kraft Springs project area.

Planting can ‘jump-start’ the regeneration process where a seed source is lacking. Planting is most successful on the cooler, moister, northerly aspects that have a fairly well developed soil profile. These sites can be identified using professional knowledge, pre- and post-fire photo interpretation, topographic maps, LANDSAT imagery to locate where suitable conditions and moderate to dense cover stands occurred prior to the fire. This was previously demonstrated on the Sioux Ranger District with over 4,000 acres of successful artificial plantations during the Brewer Fire restoration effort in the 1990’s. The cooler, moist aspects within the fire perimeter would be very favorable for successful artificial reforestation. Planting is not proposed within the Kraft Springs project area on warm, dry sites or sites with shallow soils where post-planting mortality is expected to be high and the associated costs are much higher to successfully achieve desired stocking.

3.3.5 ENVIRONMENTAL EFFECTS - FOREST VEGETATION

3.3.5.1 ALTERNATIVE 1: NO ACTION

No removal of fire-damaged trees would occur under this alternative. Large woody debris will exceed the recommended amount where the material is present.

The Kraft Springs fire moved large continuous areas (approximately 12,045 acres) of forest cover back to grass/forb/shrub growth stage with little or no forest canopy remaining as well as affecting approximately 10,175 acres within the Brewer fire that were developing into the seedling/sapling stage. These openings combined with 1,900 acres that were in this stage as result of Brewer fire (101 and 201 strata) and were not affected by the Kraft Springs fire has resulted in approximately 24,120 acres of openings that were previously forested within the project area. These openings range in size from 10 to 4,500 acres, with many continuous openings greater than 1,000 acres.

3.3.5.2 ALTERNATIVE 2: PROPOSED ACTION

Salvage cutting or noncommercial fuels treatments will occur on 10,890 acres. Only dead and dying trees will be harvested. No trees with a live (green) crown ratio greater than or equal to 50% will be harvested. There will be no additional openings in the forested canopy other than those created by fire.

Salvage cutting and associated fuels treatments will occur on approximately 6,260 acres, noncommercial fuels treatments will occur on approximately 1,980 acres and noncommercial delayed fuels treatment will occur on approximately 2,650 acres. Treatments on the moderate to high burn intensity acres with total stand modification will remove the entire stand of trees, except those designated as wildlife snags or reserve trees within a delineated unit. This creates a new even-aged stand of trees. Palatable grasses, forbs, and browse may increase in ponderosa pine types from as little as 50 to 200 pounds to over 800 pounds per acre in created openings (Patton, 1987, p. 39). These acres are lost as feeding and nesting habitat for forest dependent wildlife species. If regenerated, this habitat although initially lost by the opening, will in the future (120 to 150 years) be habitat for animals requiring mature trees. Small rodents populations will increase in these openings, particularly if some slash is allowed to remain as cover. Leaving snags will allow perches for birds that prey on these rodents.

Treatments in the moderate burn intensity acres with partial stand modification where the fires resulted in high mortality will remove dead or dying trees and leave live trees (where available) as seed bearers and to provide forest cover. These trees can produce seed for natural regeneration, help maintain endemic populations of insects that are used for prey by many birds and small mammals, and could become future snags for cavity dependent wildlife.

Salvage cutting with fuels treatments, noncommercial fuels treatment and noncommercial delayed fuels treatment will remove fire-damaged trees on 10,890 acres. The coarse woody debris retention prescription will maintain a CWD of 10-15 tons per acre post treatments.

3.3.5.3 ALTERNATIVE 3

Noncommercial fuels treatments will occur on 10,890 acres of which approximately 5,165 acres will be immediate and 5,725 acres will be delayed. Only dead and dying trees will be felled and treated. No trees with a live (green) crown ratio greater than or equal to 50% will be felled. There will be no additional openings in the forested canopy other than those created by fire. The effects of the treatments will be similar to alternative 2.

Noncommercial-immediate fuels treatment and noncommercial-delayed fuels treatment will remove fire-damaged trees on 10,890 acres. The coarse woody debris retention prescription will maintain a CWD of 10-15 tons per acre post treatments.

3.3.5.4 EFFECTS OF REGENERATION STRATEGIES

The following Table III-12 displays the estimated acres for each regeneration strategy by alternative.

Table III-12: Kraft Springs Regeneration Strategies by Alternative

Alternative	Regeneration Strategy		
	Natural	Delayed Natural	Artificial (Planting)
1	6,080 ac	16,140 ac	0 ac
2	6,080 ac	8,270 ac	7,870 ac
3	6,080 ac	8,270 ac	7,870 ac

Under natural regeneration, sites could take five to ten years to reforest to desired stocking. Under delayed natural regeneration, drier sites could take 100 years or more to reforest, and moist sites could take 60-100 years or more. The delayed regeneration areas that are within a few hundred feet of a seed source will reforest within 5 years. Areas that are further than a few hundred feet will reforest as the new seedlings adjacent to the seed source grow to an age (40-80 years) then produce viable seed. Large areas within the project area could take many years (80 to 100 years or more) to reforest. The span of years for delayed regeneration in this analysis will be 5 to 100 or more.

Under artificial regeneration (planting) sites could take five to seven years to reforest to desired stocking. The regeneration strategies for the burned area are based on a regeneration need caused by a stand replacing fire event, regardless of what type of post-fire salvage cutting or fuels treatment occur. Therefore, alternatives 2 and 3 have the same regeneration strategies.

3.3.5.5 ALTERNATIVE 1: NO ACTION

Natural processes for reforesting the Kraft Springs burn area will occur. No planting is proposed. Approximately 22,220 acres of forested stands experienced a burn intensity that resulted in an understocked condition and a regeneration need. Of those acres, 6,080 have an adequate seed source and suitable conditions to naturally regenerate within 5 years.

The remaining 16,140 acres will have delayed natural regeneration. These areas could take 60 to 100 or more years to reforest. Of these acres, 7,850 occur on drier, warmer sites and will take the longest (100 years plus) to reforest to pre-fire conditions. These sites will likely be dominated by grass and forbs for long periods and will likely develop into naturally occurring savanna type landscapes. These ecological settings do not generally support continuous, dense stands of ponderosa pine. Increased forage production would be available for longer periods of time (up to 100 years). Prior to wildfire exclusion (the past 80 years), open savanna ponderosa pine/grasslands would have dominated on these sites.

Of the delayed natural regeneration acres, 8,290 occur on cooler, moist sites. These ecological settings can support moderate to dense stands of ponderosa pine but could take 60 to 100 years or more to reforest to desired stocking conditions due to an inadequate seed source. Shrubs, forbs, and grasses will dominate the sites during the first 10 to 60 years of tree re-establishment. As the seed source becomes available, moderate to dense stands of ponderosa pine will replace these communities. Where seed is not available, previously forested sites will develop shrub cover, which has low to moderate, forage values. Browse species for wildlife will be available for longer periods prior to natural regeneration, but thermal and hiding cover will be minimized until trees have grown for 15 to 25 years. Prior to aggressive wildfire exclusion, moderate to dense stands of ponderosa pine would have occurred on these sites.

Of the 8,290 acres with delayed natural regeneration that occur on cooler, moister sites, 7,870 acres have a high potential for planting success at a reasonable cost. Planting would speed up the successional process and allow these acres to reforest more quickly. Forest Plan goals and Management Area standards for the forested ecosystems enhance watershed stabilization, wildlife habitat and cover, seed source establishment, timber production recovery, wildlife dependent on forested ecosystems and vegetation diversity. By not planting these acres, the benefits of forested ecosystems will be delayed for longer periods of time (60 to 100 years or more).

3.3.5.6 ALTERNATIVE 2: PROPOSED ACTION

Of the approximately 22,220 acres of forested stands acres with a regeneration need, 6,080 have an adequate seed source and suitable conditions to naturally regenerate within 5 years. Approximately 7,850 acres occur on dry, warm sites with a limited seed source and unsuitable conditions or are not economical to plant efficiently. These areas are in the delayed natural regeneration strategy and will require 60 to 100 years to become adequately stocked for the site. Planting is proposed on approximately 7,870 acres. Planting will occur on sites where a seed source is not thought to be adequate to restock within five years and the ecological setting supported moderate to dense stands of ponderosa pine prior to the burn. Forest Plan goals for forested sites will be met more quickly under Alternative 2.

3.3.5.7 ALTERNATIVE 3:

Effects are the same as Alternative 2.

3.3.6 CUMULATIVE EFFECTS

This section will present a cumulative effect analysis for the vegetation resource area for the Kraft Springs Project. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

Past Actions

Past actions in the project area included grazing management, wildland fire exclusion, firewood cutting, prescribed fire activities, wildland fires, recreational hunting, stocking control (precommercial thinning and timber harvesting) followed by fuels treatments (piling and burning). Past management activities and wildfires are documented in TSMRS from 1988 to 2002 on 76,000 acres. Regeneration harvest systems have been implemented on 59 acres from 1988 to 1989 and intermediate silvicultural practices on 17 acres in 1988 and 1998. The size, location, and year of occurrence identified with past management or wildfires are located in the project files and on TSMRS overlay maps at the district office.

Present Actions

No active logging or stocking treatments are being conducted in the project area. Present activities include: livestock grazing, wildland fire suppression, recreational hunting, hazard tree felling along selected system roads, road closures for safety and erosion concerns, and watershed and erosion restoration projects (USFS, 2002). There is potential for salvage cutting on adjacent private lands. Two private landowners have indicated they are investigating the possibility of salvage cutting portions of their forestlands.

Reasonably Foreseeable Future Actions

Following the Brewer fire (1988) vast acreages where seed sources was adequate have successfully regenerated with 3,000 to 10,000 trees per acre. The project area contains a portion of the complex that was not affected by the Kraft Springs fire. These areas are approximately 14 years old and because of tree density competition for light, moisture, and nutrients is heavy. This competition greatly affects tree health and vigor and makes trees more susceptible to disease and insect attack. In order to meet Forest Plan desired conditions for promoting forest health, improving forage, ensuring wildlife habitat, and reducing risk of wildfire, tree density should be reduced. Stocking control could be achieved by prescribed fire and/or mechanical means.

An assessment beyond the proposed treatment areas within the project area will be performed to determine the existing conditions, the potential for natural regeneration, and planting needs to meet timber management goals for the forested landscape. There is potential to perform stocking control in the 1988 Brewer fire regeneration to reduce fuel risks and promote forest health where the wildfires of 2002 did not burn intensely. Grazing management systems and wildland fire suppression will still occur.

Over the next 3 to 8 years, post-fire planting of ponderosa pine may occur to reforest areas that do not have adequate seed sources. Monitoring of post-fire natural regeneration and any subsequent planting to ensure successful stocking is required (Forest Plan, p. 107). In 17 to 20 years, thinning of post-fire natural regeneration within the Kraft Springs burn area may be required to meet Forest Plan desired conditions.

3.3.6.1 SUMMARY OF CUMULATIVE EFFECTS

The fire had direct effect on the forested ecosystem. Stand replacement fire occurred over 40% of the forested landscape. Some of these areas may require planting where no seed source is available due to NFMA requirements on timberlands classified as suitable.

Monitoring over the past 14 years of the 1988 wildfire regeneration on the Sioux and Ashland Ranger Districts has documented opportunities for the need for planting where classified as suitable where there was no post-fire seed source and there has been no significant amounts of natural regeneration. Areas that had adequate seed source naturally regenerated. This is very evident on the past wildfires of 1988 and in most cases stocking is well above desired conditions.

Forested areas with minor to moderate mortality have a post-fire existing condition that meets or will meet (with management) Forest Plan desired conditions. Low mortality areas will not require a regeneration strategy. The unburned area within the Kraft Springs fire perimeter, including grassland, is approximately 5%.

Ponderosa pine stands go through six development stages: grass/forb/shrub, seedling/sapling, young forest, mid-aged forest, mature forest, and old forest. Each stage presents unique vegetation composition and structure, and provides resource values to move towards Forest Plan desired conditions. Depending on management area direction and regeneration strategy, the time needed for burned areas to progress through the development stages will vary.

Sites with inadequate seed source for natural regeneration and sites that are not planted will spend more time in the grass/forb stage prior to moving into the seedling/sapling stage (60 to 100 years or more). The effects will be a displacement of wildlife species dependent on forest cover and a gain in forage and browse production. Comparatively, sites with adequate seed source or those that are planted will move to the seedling/sapling development stage and reach the mature forest stage sooner. The forested landscape has changed from a pre-fire dominant mid-aged to mature forested stage (59%) to a post-fire grass/forb/shrub stage dominant landscape (>40%).

The drier, non-productive sites will slowly be reforested and will represent the savanna type landscape of pre fire exclusion. With frequent fire intervals (prescribed or natural) and/or mechanical stocking control these can be maintained. The moist, cooler sites with natural regeneration, delayed natural regeneration and planting will once again be forested and with frequent fire and/or mechanical stocking controls will represent the forested sites of pre fire exclusion. However, delayed natural regeneration on moist, cooler sites without an adequate seed source may not have ponderosa pine forest cover for 100 or more years.

Proposed removal of fire-damaged trees (salvage cutting with fuel treatment, noncommercial fuel treatment and delayed noncommercial fuel treatment) will have a positive benefit by reducing large fuels and enhancing strategic access for crews and equipment during fire suppression activities. Future fire effects in these areas will include less residence time and have minimal impacts to the soil and forest resources.

3.4 WATERSHED – SOILS

3.4.1 INTRODUCTION

The Kraft Springs fire was a large, relatively intense fire, at least partially wind and drought driven. The area is extensively roaded and there are inclusions of private land with extensive working ranches near Forest borders. Primary uses are cattle grazing, wildlife production, timber production, and some recreation. Potential effects from the Kraft Springs fire are accelerated soil erosion, damage of bare soils by grazing, and moderately increased storm peak flows with attendant road drainage system effects. Landscapes in the affected areas are primarily level buttes with short, moderately steep side slopes, composed of sandstone with some siltstone. Vegetation types are primarily ponderosa pine forests with interspersed grasslands and rocky cliffs. Stream systems are ephemeral or intermittent. There are no indigenous fisheries. The project is within the Upper Little Missouri and Boxelder watersheds (See Figure III-1).

Region 10 Missouri Region -- The drainage within the United States of:

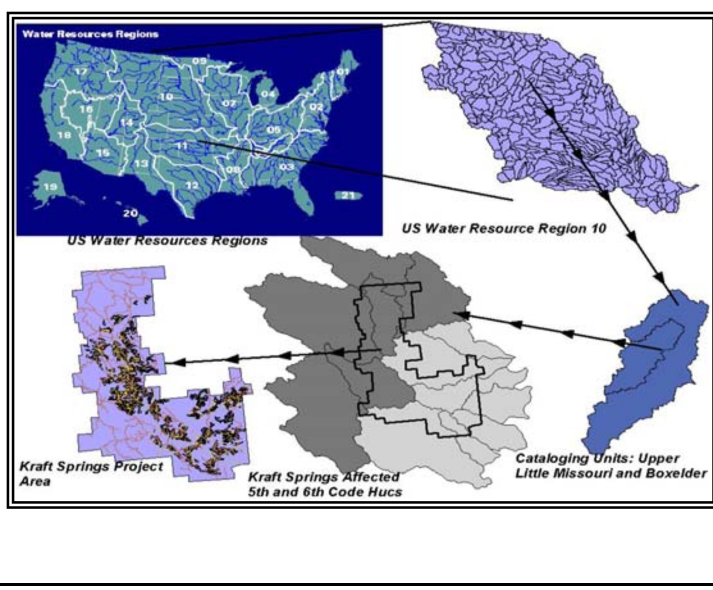
(a) The Missouri River Basin, (b) the Saskatchewan River Basin, and (c) several small closed basins. Includes all of Nebraska and parts of Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, North Dakota, South Dakota, and Wyoming.

Subregion 1011 -- Missouri-Little Missouri: The Missouri River Basin below the confluence with the Yellowstone River Basin to Garrison Dam. Montana, North Dakota, South Dakota, Wyoming. Area = 17300 sq.mi.

Accounting Unit 101102 -- Little Missouri: The Little Missouri River Basin. Montana, North Dakota, South Dakota, Wyoming. Area = 9550 sq.mi.

Cataloging Units-- ***10110201 -- Upper Little Missouri***. Montana, North Dakota, South Dakota, Wyoming. Area = 3490 sq.mi. ***10110202 -- Boxelder. Montana***, North Dakota, South Dakota. Area = 1210 sq.mi.

Figure III-1: Project Area in relation to Watershed HUCs



3.4.2 FIELD SURVEYS/RESOURCE CONTACTS

Two field surveys were made prior to the Kraft Springs wildfire; the first was in September of 2001 and the second in April of 2002. A third survey was conducted in October of 2002 after the Kraft Springs fire. The surveys were conducted onsite to determine current condition of the watershed and soil resources, and to evaluate the potential affects from proposed vegetation management activities.

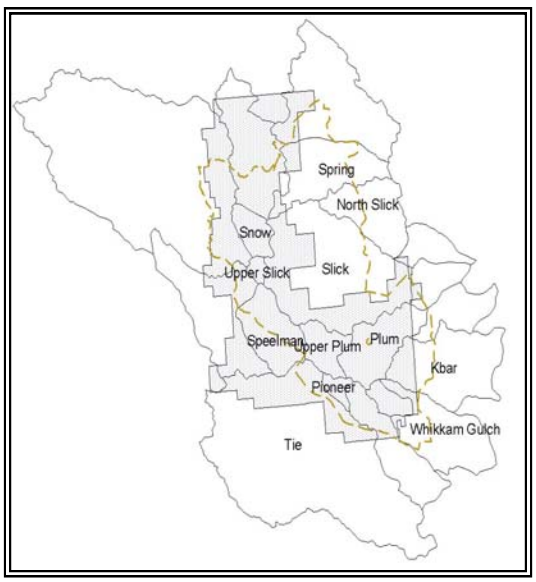
Fieldwork and analysis methods were coordinated through the local Forest Soils Scientist. Information on current water quality guidelines and stream segment status was collected from the Environmental Protection Agency, Montana Department of Environmental Quality, and from literature from the Montana Department of State Lands.

3.4.3 AFFECTED ENVIRONMENT

The Kraft Springs Fire burned portions of five Fifth Field Hydrologic Units (HUCs) that feed Box Elder Creek and the Little Missouri River, ultimately feeding the Missouri River. Sixth Field HUCs within these Fifth Field HUCs with significant portions of their watershed burned include Spring, North Slick, Slick, Plum, Wickham, Speelmon, and Snow Creeks. Tie and K Bar Creeks had relatively very little of their contributing area burned. Land ownerships include mainly National Forest system and private lands.

The analysis area for the Kraft Springs Project affected environment was limited to the actual Forest Service ownership within the Kraft Springs Fire Area. Using actual watershed boundaries for the watershed resource on this project is not practical or reasonable in this instance because the project is located on a large butte land feature. This means that the project is, in several instances, only a small portion of several watersheds and is located at the upper elevations of drainage areas (See Figure III-2). Therefore, an analysis using watershed boundaries would dilute the analysis results with large non-activity areas.

Figure III-2: Fire Area (dashed line), Project Area (gray color), and 6th Code HUC boundaries (gray lines) showing the relationship between the fire, project boundary, and watersheds.



3.4.3.1 SOILS

As indicated above, the area is located on a large butte in the middle of a short grass prairie. Elevations range from about 4,120 feet at Tri-point Lookout down to about 3,200 feet where streams leave the fire perimeter. Annual rainfall is low, 12 – 16 inches. Landscapes in the affected areas are primarily level buttes and short moderately steep sideslopes, composed of sandstone with some siltstone. Some slopes near Forest boundaries are developed in siltstone and are barren, similar to "badland" landforms. Prior to the fire, most of the area was well vegetated with grasses and woody brush species. As indicated above, bare soil areas were not uncommon near bluffs and rock outcrops, but overall, ground cover was sufficient to hinder or retard the natural eroding nature of this landscape.

Approximately one third of the western and southern portions of the project area were burned in the Brewer fire in 1988. The portions of the project area that were affected by the fire experienced a mosaic of burn patterns and severities/intensities. Those areas that burned at high fire intensity were recovering well in terms of hydrologic function and soil productivity. Ground cover from grasses and downed woody material was providing adequate protection from accelerated soil erosion (See Figure III-3).

Figure III-3: Ground cover and down woody material in old Brewer Fire area

Upland buttes and most side slopes have soils developed in weathered sandstone with some siltstone. These soils are widespread and make up about 70% of the burned area. They are generally loamy and coarse loamy (moderately coarse to medium textured) with moderately rapid infiltration rates and high percolation rates. Runoff is uncommon in these areas. Active surface erosion is uncommon under vegetative cover.

Soil erosion hazard in the project area is defined as the potential for soil detachment and transport given a landscape's slope, soil erodibility, soil water-holding capacity, and precipitation pattern. It assumes no vegetation is present on the disturbance site. A "high" hazard occurs where disturbance is likely to create significant soil erosion, and high-cost mitigation measures may be needed to reduce it. "Moderate" hazard occurs where disturbance is likely to create significant soil erosion, but special mitigation measures may be sufficient to prevent or reduce it. "Low" hazard occurs where significant soil erosion is unlikely even after disturbance. Soil erosion hazard is low to moderate in most of the survey area. However, there are relatively small areas near buttes and in the southwestern part that have a “High” erosion hazard. These areas are defined as having an erodibility factor (Kf) equal to or exceeding 0.43 and representative slope gradients greater than 30%.

Prior to the Kraft Springs Fire, field surveys for soil and water resources were conducted for project activities that had been planned for the area before the fire. The project area was stratified into areas of recent past management activities (soil disturbance) and proposed project activity areas. A field survey of the project area was then conducted to assess the current condition of the soil resource and whether or not a more intense field survey was warranted. The soil quality standards that were surveyed were compaction, rutting, displacement, severely burned soils, surface erosion, soil mass movement, and organic matter guidelines. With the exception of one sample site out of 22, none of the areas showed any lingering signs of impacts to the soil resource. All areas that were examined appear to have soils that are functioning at or near their productive capacity. The one sample site that did show impacts included an old skid trail located in a clayey swale area that had indications of soil compaction. The continuing soil compaction effects are the result of poor skid trail placement in a wet swale area. None of the areas that were sampled failed to meet the regional soil quality standards. All areas had abundant amounts of large woody material and exceed the amounts recommended in Graham et al (1994).

The Kraft Springs fire was a very fast moving intense fire that consumed much of the existing ground cover and organic matter (See Appendix B-1 for Fire Intensity and Severity definitions and Appendix A, Map 1 for the Kraft Springs Burn Intensity/Severity Map). Fire intensity and severity was mapped for the fire area and indicate that while fire intensities were high, fire severity tended to be low.

Fire intensity and severity mapping conducted on the Kraft Springs Fire classified 33% of the burn as high burn intensity with low burn severity, 29 % as moderate intensity with low burn severity, one percent as low burn intensity and low burn severity, and 37 % grassland with low severity. These results imply that though vegetation was lost in the blaze, with the exception of the loss of surface organic material associated with long-term soil productivity, ecological effects and hydrologic effects of this fire are minimal and should be relatively short-term. Infiltration capacity of the soils will be unchanged from pre-fire conditions and it appears that most of the root crowns associated with forest floor vegetation will survive to re-sprout (USDA Forest Service, 2002).

The majority of the high and moderate burn intensity areas are expected to recover to a resilient ground cover condition within 1-2 years. The grass and smaller woody vegetation types common to the project area are very conducive to quick recovery after wildfires. There were some localized areas of high burn severity, however these areas are generally very small and do not pose a long term risk to watershed recovery. The impacts from the fire to long-term soil productivity could be substantial. Almost all of the surface organic materials were consumed in many areas, especially those that burned in the Brewer Fire in 1988. The continuing recruitment of organic material is critical to the long-term health of soils and therefore to future forests. Graham (2002) writes:

"Larger fuels consisting of standing dead trees, large limbs, and down logs or coarse woody debris (CWD) play critical roles in fixing and storing nitrogen (N), protecting the soil surface, and supplying organic matter to the forest floor."

Coarse Woody Debris is further important in terms of its ability to act as a reservoir or sponge for water storage at the soil surface, its effect on stream channel stability, and also for its usefulness as habitat for some wildlife species. Coarse Woody Debris (CWD) (dead organic material 3 inches in diameter and larger) and Large Woody Material (LWM) (a subset of CWD which includes snags and downed organic material 12 inches in diameter and larger) may be lacking in the near future. Many forested areas will have a short-term (0 – 10 years) deficit in CWD, but have a near term spike in CWD (and LWM) as dead trees fall down over the next 1-2 decades. However, after that time, there will be very little recruitment of larger diameter organic material to the forest floor until a new forest is re-established.

Data on specific amounts of CWD and LWM for the Long Pines administrative unit was unavailable, but Graham (1994) has collected data in similar healthy dry pine types and found that they tend to have approximately 10 – 15 tons/acre of CWD. Of that amount, it is estimated that LWM would contribute approximately 50 percent, or 8 – 10 tons/acre.

3.4.3.2 STREAM CHANNELS

Streams within the Kraft Springs Fire tend to have very short surface flow durations, likely after substantial rainfall events or snowmelt. Most streams can be characterized as intermittent or ephemeral. Speelman and North Tie Creeks do have perennial reaches, with 5 to 10 gallon/minute flows noted during reconnaissance. Most stream bottom areas are composed of a floodplain but no developed channel system. Developed stream channels are rare, generally found where the watershed area is large enough to support the hydraulic energy required to create and maintain channel systems. As stream systems leave areas of relief and enter very broad valleys and prairies, surface flows become increasingly rare as evidenced by the lack of defined channels and riparian vegetation. Stream flow is lost either to evapotranspiration or recharge of groundwater systems (USDA Forest Service, 2002).

Livestock are currently being kept out of the fire area until managers can determine that the landscape has recovered sufficiently to sustain grazing activities and minimize impacts to other resources. Most of the riparian zones within the fire area burned at a low to moderate burn intensity, however there are a few riparian areas or woody draws that had a major ponderosa pine component and burned at a moderate to high burn intensity. These areas will need to be monitored closely to ensure that post-fire activities do not impede their recovery.

Springs and seeps exist in other draws, likely correlating with geologic structural features associated with bedrock. In the past livestock were using these features heavily and are contributing to poor water quality and wetland habitat conditions at those spring sites. There are watering troughs at many of these springs, but they are generally not located far enough away from the channel to diminish the impacts from the cattle to the springs

Water Quality

There are no 303d listed waterbodies within the project area and there are no listed segments downstream within any reasonable distance that could be impacted by this project. Roads can cause major impacts to stream systems and water quality (Elliot, 1999). Channel constriction and sediment delivery from roads often result from roads that are located next to stream channels. However, in most instances, the roads are not contributing to any areas of stream flow constriction or sediment delivery to stream channels. Of the total 228 miles of road within the project area, there are approximately 12.2 miles of roads that are immediately adjacent to stream channels. Utilizing the WEPP Erosion Prediction Model, it is estimated that these road segments are delivering about 20 tons of sediment annually above the natural erosion rates for the area. According to the model, roads beyond 100 feet of the road were not delivering substantial amounts of sediment and so were not included in the sediment delivery analysis. Most roads in the area tend to be very low standard native surface or two-track construction and are located away from stream channels (See Figure III-4). However, there are some localized areas where wet season travel and a lack of road maintenance has created moderately to severely rutted roads. In these instances, the wheel ruts are channeling water and sediment, some of which is delivered directly to a channel. Examples of these road impacts can be seen on the Snow Creek road below the private property in holdings.

Figure III-4: Example of a typical road in Kraft Springs Project Area.

3.4.4 ENVIRONMENTAL EFFECTS

The proposed action and other action alternatives would treat the burned forest stands to reduce the long-term fire hazard potential and to recover the economic value of the wood. The methods used to accomplish these goals would include a combination of commercial and non-commercial fuels hazard reduction activities. The forest stand fuel hazard reduction activities would require the construction of temporary roads, reconstruction of some existing roads, and the use of mechanized equipment to remove the thinned materials from the woods. All action alternatives would utilize streamside buffers as described by the Montana State Forest Practices Act (See Table III-13). All streams with a definable bed and bank in the project area would receive at least a 50-foot stream buffer and in some instances a wider buffer would be applied where adjacent slope steepness or burn condition warranted more stream protection.

Table III-13: Recommended Stream Buffer Widths by Slope.

Slope of Mechanical Activity Unit Adjacent to Stream Channel	Buffer Distance (feet)
Less than 15%	50
Between 15% and 30%	50 on Mixed Commercial, 100 on Black Commercial
Greater than 30%	100

Generally, those activities associated with the removal of timber and materials from the forest using mechanized equipment have the highest potential for soil disturbance and prolonged impacts to the soil resource. The noncommercial/non-mechanical activities are not expected to have any adverse effects to the soil or water resource. Yarding activities and road construction associated with both commercial and noncommercial activities can pose considerable risk to soils and water quality after wildfires (Beschta, 1994). Steep slopes and sensitive soils are prone to negative disturbances from management activities after wildfires; the burned landscape condition is particularly susceptible to accelerated soil erosion and soil compaction in the short-term.

However, as indicated above, the project area tends to have relatively gentle slopes and the few sensitive soil areas are generally located in areas where project activities will not occur. Past harvest activities indicate that soils recover relatively quickly from moderate ground disturbing activities. Both the effects of the fire and the effects of any harvest activities are expected to heal within the near future (3 – 10 years). All definable stream channels will receive a buffer of at least 50 feet and roads will not be located within those buffers unless it is necessary to cross the channel. In those instances, roads will be located at right angles to the channel to create as little impact to the channel as is possible.

In most instances, it is not possible to absolutely "design out" all sediment delivery coming from existing and proposed road activities. Roads often require stream crossings or the use of gently sloped lands that are most common near stream channels. Therefore the total prevention of sediment delivery to stream channels is not feasible where roads require access across, or locations parallel to and adjacent to streams. Therefore, this analysis focuses on those locations where the road location is sufficiently close to stream channels to deliver sediments from roading activities.

Further, (as part of project design) to aid in the recovery of long-term soil productivity it will be necessary to leave Coarse Woody Material (CWM) and Large Woody Material (LWM). Healthy dry pine forests that have sustainable long-term soil productivity typically have an average range of 10 – 15 tons of Coarse Woody Debris (CWD). There are relatively few studies that indicate the necessary amounts of CWD or LWM to leave after a severe wildfire, but Brown (in press) does indicate that:

"The upper limit of the recommended ranges or higher seems appropriate for stands recovering from high severity wildfire where much of the partially decomposed CWD and other forest floor organic matter was consumed"

In order to meet the upper end of Grahams recommendations, it will be necessary to leave 10 – 15 tons/acre of CWD. It is unknown what portion of CWD (all surface fuels 3 inches in diameter and greater) was historically attributable to LWM (the subset of CWD that is 12 inches in diameter and greater). However, based on field observations, it is believed to have contributed at least 50% of the total amount of the Coarse Woody Debris. Based on this estimate, it would be prudent to maintain approximately 5 – 8 tons of LWM scattered over the landscape for long-term soil productivity. The recommended range of LWM pieces for long term soil productivity is arrived at by utilizing the upper limit of the CWD range or a little bit higher as Brown suggests, and Tables 1 and 2 in Brown et al (in press):

Table III-14: Project design criteria for Large Woody Material to be left on the high and moderate burn intensity forest stands.

Diameter of LWM (inches)	Number of Pieces to promote Long Term Soil Productivity (approximate number of pieces/acre)
12	–15 - 20
14	–10 - 15
16	6 - 10
20	4 - 6
24	2 - 4

Note: piece length should be a minimum of 8 feet and standing snags are included as future recruitment for LWM and CWD. Longer pieces of LWM can be tabulated for multiples of 8-foot long pieces.

The remaining CWD (up to 7 - 10 tons) that is less than 12 inches in diameter should be lopped and scattered during or immediately after harvest activities.

It is not expected that the fuel reduction activities will have lasting impacts on the soil and water resources (See Appendix B-3, responses to the Beschta Report). Additionally, the immediate incorporation of extra Coarse Woody Debris from thinning activities will be a near-term benefit in terms of adding hydrologic roughness to the hillslope to reduce erosion and also to reincorporate organic material into soil surface. Ground based logging activities do have the potential to cause soil displacement, compaction, rutting, and accelerated soil erosion. However, the application of soil and water conservation Best Management Practices (BMPs) should further minimize the extent of impacts to soils.

3.4.4.1 ALTERNATIVE #1: NO ACTION

The no action alternative would maintain the trend of the current condition for the watershed and soils resources. The watershed and soils conditions would continue on a slight upward trend due as the project area naturally recovers from the Kraft Springs Fire. Impacts to water source areas from livestock activity and limited sediment delivery from rutted road conditions would continue. There would be a short term deficit in surface organic material (0 – 10 Years), a near term surplus in 10 – 30 years, and a long period afterwards (until a new forest is re-established and CWD recruitment is occurring) where Coarse Woody Material would be deficit in the ecosystem. There would be a short term deficit in surface organic material (0 – 10 Years), a near term surplus in 10 – 30 years, and a long period afterwards (until a new forest is re-established and CWD recruitment is occurring) where Coarse Woody Material would be deficit in the ecosystem.

3.4.4.2 ALTERNATIVE #2: PROPOSED ACTION

Effects on Soils

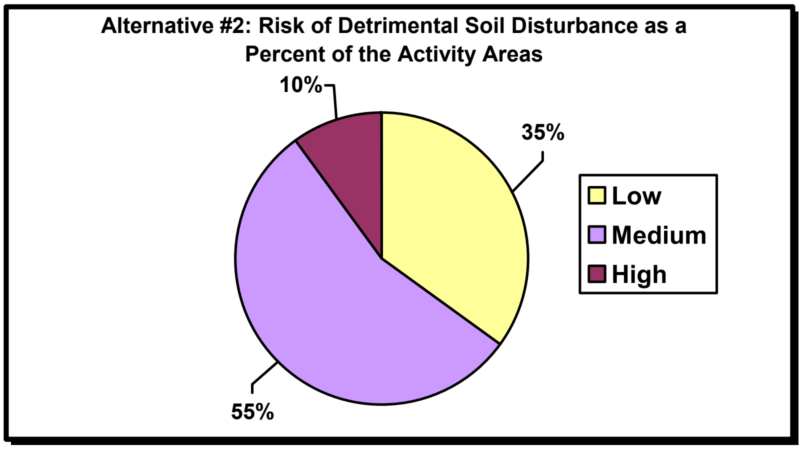
The proposed action includes a greater amount (area) of those higher impact disturbance activities (mechanical stand treatments and temporary roads). However, past harvest activities in the project area indicate that the soil resources recover from silvicultural activities within about 5-10 years. Non-treatment areas and pre-commercial areas (non-mechanical fuels reduction) all rated as low risk for detrimental soil disturbance. Areas rated as low risk for disturbance are expected to recover within 1-3 years. Those activities that rated as moderate risk for detrimental soil disturbance were units proposed for partial cutting or select cutting of timber stands. Areas rated as moderate risk for disturbance are expected to recover within 1 - 5 years. Commercial harvest areas, and other mechanical fuels reduction areas that would receive temporary roads and tractor yarding disturbance activities all rated as high potential for detrimental soil disturbance. These areas are expected to recover within 3-10 years. Regional Soil Quality Guidelines indicate that no more than 15% of any activity area can result in detrimentally disturbed soils. The areas rated as high risk for detrimental soil disturbance are considered to count towards the 15% guideline. All of these ratings consider the effect of the burned soil resource and therefore the recovery times are somewhat longer than would be expected under a green watershed condition. Table III-15 and Figure III-5 display the effects of Alternative #2 on risk of soil disturbance.

Table III-15: Alternative #2 Relative magnitude of Soil Disturbance[1].

Soil Disturbance	Percent of the Activity Areas
Low	35%
Moderate	55%
High	10%

[1] Ratings of Low, Moderate, and High are based on the relative impact of the project alternative activities.

Figure III-5: Risk of Soil Disturbance, Alternative #2



Effects on Sediment

Salvage harvest activities, aside from roading, are not expected to deliver sediment to stream channels. All harvest and roading activities will implement Forest Service BMPs. Stream buffers of at least 50 feet will also be applied to all high or moderate burn intensity stands to help insure that sediment delivery is minimized. Where adjacent hillslopes are steeper than 15 percent, it is recommended that the stream buffers be implemented as described (See Table III-13 previous pages).

The proposed action would construct 20.5 miles of temporary roads, restore or improve 67 miles of road, and maintain approximately 82 miles of existing roads. All temporary roads would be reclaimed and rehabilitated to a near natural condition after project activities are completed. According to sediment modeling utilizing the WEPP erosion prediction model, sediment delivery from roads is relatively minor (See Table III-16). Most of the road segments located next to stream channels are not delivering a lot of sediment. There are some road segments on the main Snow Creek road which are in poor condition and adjacent to stream channels. These are the main road segments that are delivering sediment, however the amount of sediment delivered is relatively small. The current conditions of the rest of the segments adjacent to channels are fair to good, so these road segments are not expected to gain a lot of sediment reduction benefit from road maintenance activities. Therefore, the volumes of sediment generated from this project should not be sufficient to degrade local or downstream channel and water quality conditions. Project road activities would contribute some sediment delivery, however the majority would continue to be the result of the existing roads not used in the project.

Table III-16: Sediment delivery from roads adjacent to stream channels

Road Activity	Road miles	Sediment Delivery (tons/year)
Existing Condition	12.2	20
Alternative 2		
Non Project Roads	9.94	17
Project Roads	1.88	3
Temp Roads	0.4	1
Total		21
W/National Fire Plan Roads-Untreated	2	21
W/National Fire Plan Roads-Treated	2	20
Sediment Savings due to NFP Roads		1

3.4.4.3 ALTERNATIVE #3

Effects on Soils

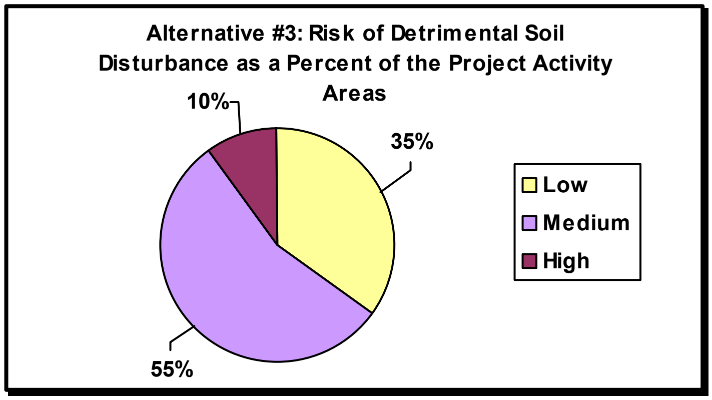
Alternative #3 would have approximately the same impact on soils as the proposed action. It does have a smaller amount (area) of those higher impact disturbance activities (mechanical stand treatments and temporary roads). However, Alternative #3 would create larger areas of hand piling and tractor piling for burning that can cause moderate to long-term detrimental soil disturbance. The burning of tractor piles and hand piles can sterilize soils when soils are exposed to long periods of intense heating underneath the piles. Non-treatment areas and pre-commercial areas (non-mechanical fuels reduction) all rated as low risk for detrimental soil disturbance. Areas rated as low risk for disturbance are expected to recover within 1-3 years. Those activities that rated as moderate risk for detrimental soil disturbance were units proposed for partial cutting or select cutting of timber stands. Areas rated as moderate risk for disturbance are expected to recover within 1 - 5 years. Hand piling and other mechanical fuels reduction areas that would have widespread pile burning and tractor yarding disturbance activities all rated as high potential for detrimental soil disturbance These areas are expected to recover within 3-10 years. Regional Soil Quality Guidelines indicate that no more than 15% the of any activity area can result in detrimentally disturbed soils. The areas rated as high risk for detrimental soil disturbance are considered to count towards the 15% guideline. All of these ratings consider the effect of the burned soil resource and therefore the recovery times are somewhat longer than would be expected under a green watershed condition. Table III-17 and Figure III-6 display the effects of Alternative #3 on risk of soil disturbance.

Table III-17: Alternative #3 Relative magnitude of Soil Disturbance[1].

Soil Disturbance	Percent of the Project Activity Areas
Low	35%
Moderate	55%
High	10%

[1]Ratings of Low, Moderate, and High are based on the relative impact of the project alternative activities.

Figure III-6: Risk of Soil Disturbance, Alternative #3



Effects on Sediment

Salvage harvest activities, aside from roading, are not expected to deliver sediment to stream channels. All harvest and roading activities will implement Forest Service BMPs. Stream buffers of at least 50 feet will also be applied all high or moderate burn intensity stands to help insure that sediment delivery is minimized. Where adjacent hillslopes are steeper than 15 percent, it is recommended that the stream buffers be implemented as described (See Table III-13 previous pages).

The risk of sediment delivery from roads is slightly less in Alternative 3 due to the absence of temporary road construction. The road reconstruction and rehabilitation work would also not be implemented in this alternative. According to sediment modeling utilizing the WEPP erosion prediction model, sediment delivery from roads is relatively minor (See Table III-18). The volumes of sediment generated from this project are not sufficient to degrade local or downstream channel and water quality conditions. The road sediment volumes are essentially the same as those found in the current condition. Use of the road system for noncommercial activities could potentially produce sediment delivery, however the majority of the sediment volume would continue to be the result of the existing roads not used in the project.

Table III-18: Alt 3 Sediment delivery from roads adjacent to stream channels

Road Activity	Road miles	Sediment Delivery (tons/year)
Existing Condition	12.2	20
Proposed Action		
Non Project Roads	9.94	20
Project Roads	1.86	0
Temp Roads	0.4	0
Total		20
National Fire Plan Roads-Untreated	2	1
National Fire Plan Roads-Treated	0	0
Sediment Savings due to NFP Roads		1

3.4.5 SUMMARY OF EFFECTS

Figure III-7 and Figure III-8 below summarize the effects discussion above for the risk of soil disturbance.

Figure III-7: Summary of Effects of Alternatives on Risk of Soil Disturbance

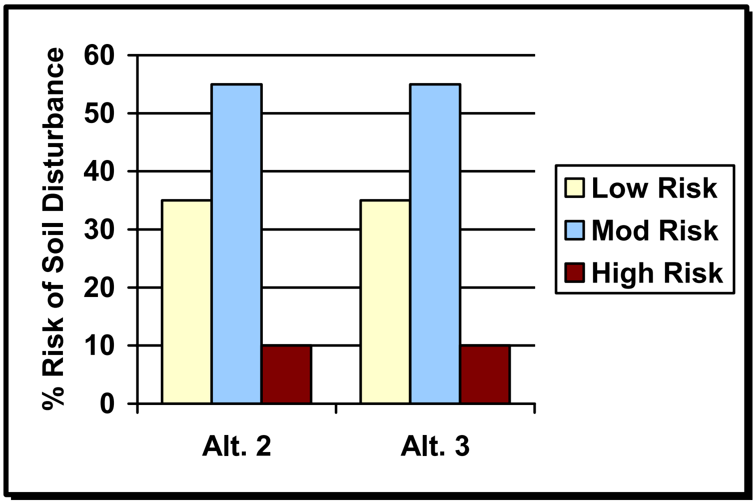
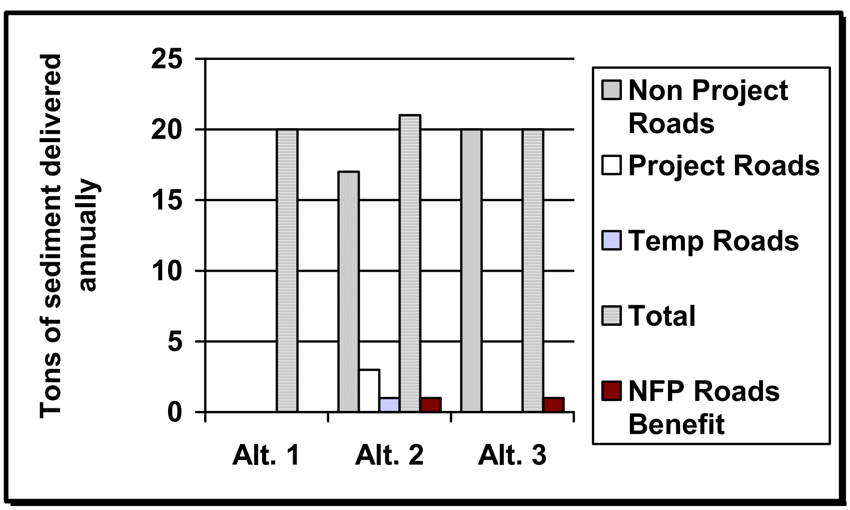


Figure III-8: Summary of Estimated Current and Project Alternative Sediment Delivery to Stream Channels.



3.4.6 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the watershed/soils resource from past, present, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.4.6.1 DISCUSSION

Those projects or activities that have the potential to combine with the proposed project alternatives to have a cumulative effect are:

- Kraft Springs Fire Suppression Activities (149 miles of fireline- primarily dozer)
- Ongoing grazing activities
- Proposed Road Decommissioning Activities of 36 miles (to be analyzed in another decision document)

The Cumulative Effect analysis area for the Kraft Springs Project includes all of the affected 6th code Hydrologic Units. The areas outside of the Kraft Springs Project area and within the affected 6th Code Hydrologic Units were not burned in the Kraft Springs Fire. These areas are mostly privately owned ranches managed for cattle production and are well grazed and moderately roaded with a mixture of low standard native surface roads, graveled roads, and paved roads.

The No Action alternative will not create a cumulative effect. There are no activities planned for the No Action alternative that would combine with past, present, and future activities to cause an accretion of effects.

Both the Proposed Action and Alternative 3 are similar in that they would treat most of the burned stands within the Kraft Springs Fire area. The difference between the two treatments is in the methods of treating those stands. The Proposed Action and Alternative 3 include activities that would require the use of mechanical ground disturbing activities to remove the excess fuel materials. Those activities, mechanical yarding of fuels and temporary road building, are the primary causes of this cumulative effect, but as noted in the Effects Analysis section, the effects of those activities should be limited in time to the short-term (1 – 3 years) and near – term (5 – 10 years). The combination of the past, ongoing, and future projects (as noted above), and either action alternative would produce relatively short and near term cumulative effects. However, those effects will be limited to the localized are where the effects occur. None of the impacts are expected to substantially affect stream channels where effects could be transmitted downstream and outside of the project area.

3.5 WILDLIFE

3.5.1 INTRODUCTION

This wildlife section will cover Threatened, Endangered, Proposed, Sensitive, Management Indicator, and Key wildlife species. The analysis will cover all expected direct, indirect, short- and long-term, and cumulative effects/impacts to all species fitting into one of the mentioned groups with habitat or documented sightings within the project area. A separate Biological Assessment (BA) will be completed for Threatened, Endangered, or Proposed species with a summary of findings within this wildlife section. A Biological Evaluation (BE) covering the Sensitive species will be summarized in this section in Table III-26. All species with special status will be addressed in this wildlife analysis. The project area was used to assess existing condition for all species. Cumulative effects areas differ depending upon species and will be discussed individually if any direct or indirect effects are expected with implementation of any alternative.

3.5.2 FIELD SURVEYS/RESOURCE CONTACTS

The project area was reviewed in September 2001 with the Forest Wildlife Biologist (Thomas Whitford), prior to the Kraft Springs fire. The area was reviewed in October 2002, to assess the changed conditions following the fire. Due to the timing of the visits, no species-specific surveys were performed. However, many species were observed both inside and outside the project area during the 2001 and 2002 visits, including: white-tailed deer, mule deer, Rocky mountain elk, pronghorn antelope, northern leopard frog, sharp-tailed grouse, turkeys, coyotes, Lewis' woodpecker, hairy woodpecker, downy woodpecker, and goshawk.

Goshawk, Landbird Monitoring, and amphibian surveys were all completed during the spring/summer of 2002. No nesting goshawks were discovered during the surveys. Much of the surveyed habitat was converted from a forested condition to grass. Landbird surveys indicated species expected to exist within the available habitat types were present within the area, prior to the fire. As that was the first year of the Landbird Monitoring, there was no way to use the information to discuss trend for this area specifically. Other national surveys, with less precise monitoring data and protocols were also researched, including the Christmas Bird Count (CBC) and Breeding Bird Survey (BBS) information. Neither of these surveys (CBC or BBS) had transects within 30 miles of the project area, so their usefulness in discussing specific trends for this area is also without much value, but help to establish an overall trend for the State and region. Data from the Natural Heritage Database information was used to help determine historic presence of those species not picked up during the Landbird Monitoring that took place in 2002. At best, trend discussions are risky even with very detailed data over many years for a specific area. This analysis will focus on habitat and changes that can be measured and interpreted from changes to habitat and its potential to affect species. This can effectively be used to determine the trend in habitat conditions and therefore be extrapolated to how species may be impacted. This is discussed in detail in the Affected Environment section of this wildlife analysis.

Several contacts with various State and Federal Agencies were made to help assess existing conditions for species near the project area. Greg Risdahl and John Ensign, Montana Fish, Game and Parks, were contacted regarding species trend and distribution information. Shelly Diesch, South Dakota Game, Fish & Parks, was contacted for similar information. Thomas Whitford and Donald Sasse, Custer National Forest, were contacted and provided current and historic information as well.

3.5.3 FOREST WILDLIFE SPECIES DIRECTION

The National Forest Management Act (NFMA) requires forests to "provide for diversity of plant and animal communities and tree species consistent with the overall multiple use objectives of the planning area". To accomplish this, NFMA directs that an evaluation of diversity be done "in terms of its prior and present condition" and "consider how diversity will be affected by various mixes of resource outputs and uses". The Act also requires forests to "maintain viable populations of all native and desired non-native wildlife vertebrate species in the planning area". The Act defines a viable population as one having "the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area".

The Endangered Species Act requires forests to "manage habitat for all existing native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species", conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species" and to avoid actions "which may cause a species to become threatened or endangered".

The goal of wildlife and fisheries management is to manage and/or improve key wildlife and fisheries habitats, to enhance habitat quality and diversity, and to provide wildlife and fish-oriented recreation opportunities. Most of the critical habitat areas have been incorporated into management areas that maintain or improve these key habitats. Wildlife and fisheries management is considered in all management areas and the level of wildlife habitat management will increase over time.

The objective of wildlife management is to emphasize active management of wildlife habitat. Mitigation of adverse effects from other resources activities will continue. Threatened and Endangered plants and animals are given special consideration on an area by area and species by species basis. Special consideration is also given to certain high interest species, such as bighorn sheep and prairie chickens, by designating key habitat areas where other resource activities are modified.

Forest Plan direction is to manage the land to maintain at least viable populations of existing native and desirable non-native vertebrate species, promote the conservation of federally listed threatened and endangered species and coordinate and cooperate with appropriate state, federal and private agencies in the management of habitats for major interest species.

Habitat Indicator Species (Management Indicator Species) - These are species whose population changes are believed to indicate effects of management on other species of a major biological community or on water quality. Forest Plan direction provides for the maintenance and improvement of habitats for these indicator species. Table III-19 lists the Habitat Indicator Species:

Table III-19: Habitat Indicator Species

Indicator Species	Habitat
Goshawk	Old Growth
White-tailed Deer	Dog-hair Ponderosa Pine
Ruffed Grouse	Aspen
Lark Sparrow	Open Savanna
Northern Oriole	Riparian – Tree
Yellow Warbler	Riparian – Shrub
Ovenbird	Hardwood Draw – Tree
Rufus-sided Towhee	Hardwood Draw – Shrub
Brewer's Sparrow	Evergreen Shrub – Sagebrush
Sharp-tailed Grouse	Prairie Grasslands

3.5.4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

On the Custer National Forest, all of the species considered in this document occur over a geographical area encompassing several states. Because their distribution is so large, the viability of the species is not tied to actions occurring only on a small portion of their natural range such as the Custer National Forest. Therefore, one could argue that viability at the Forest scale is not an issue. Even so, it is recognized that adverse actions occurring within a small portion of the range, if extended out to their entire range, could lead to problems in species viability over time. Therefore, it is important to assess how the actions within a portion of a species range contribute to the viability across the range.

To address this, activities are evaluated in terms of their effect on habitat, at the project level, landscape level, and planning unit, if needed. At the project and forest level, the analysis focuses upon the likelihood of the species or its habitat "persisting" within the analysis area over time. A qualitative rating of persistence is made based upon demographic, habitat, and environmental factors.

- Demographic: Life history, population, distribution, birth and death rates, sex ratios, and dispersal potentials within the landscape.
- Habitat: Amount, quality, and distribution of habitat
- Environment: Disturbance regimes likely within the landscape, successional pathways, and vulnerability to catastrophic events.

Demographics, habitat, and environmental factors rarely function independently. Loss of habitat or increases in disturbance (natural or man made) results in changes in population levels and distribution affect demographics. However, at any given point in time, one of the factors may be dominant in determining the likelihood of species persistence within the analysis area. For example, prior to wolves being released in central Idaho, although adequate prey base and habitat existed, wolf numbers were extremely low. Most wolves were thought to be dispersing individuals and no information on the existence of den sites existed. There simply were not enough wolves in central Idaho to form breeding pairs. However, since the release, wolf numbers in central Idaho have steadily increased. The issue of wolf persistence changed from the number of wolves to wolf mortality. As wolf numbers continue to increase, eventually, wolf mortality issues would subside and prey base and habitat issues would determine wolf distribution and abundance within central Idaho.

Figure III-9 and Table III-20 shows the persistence analysis process being used for this analysis.

Figure III-9: Decision Chart-Persistence Analysis Process

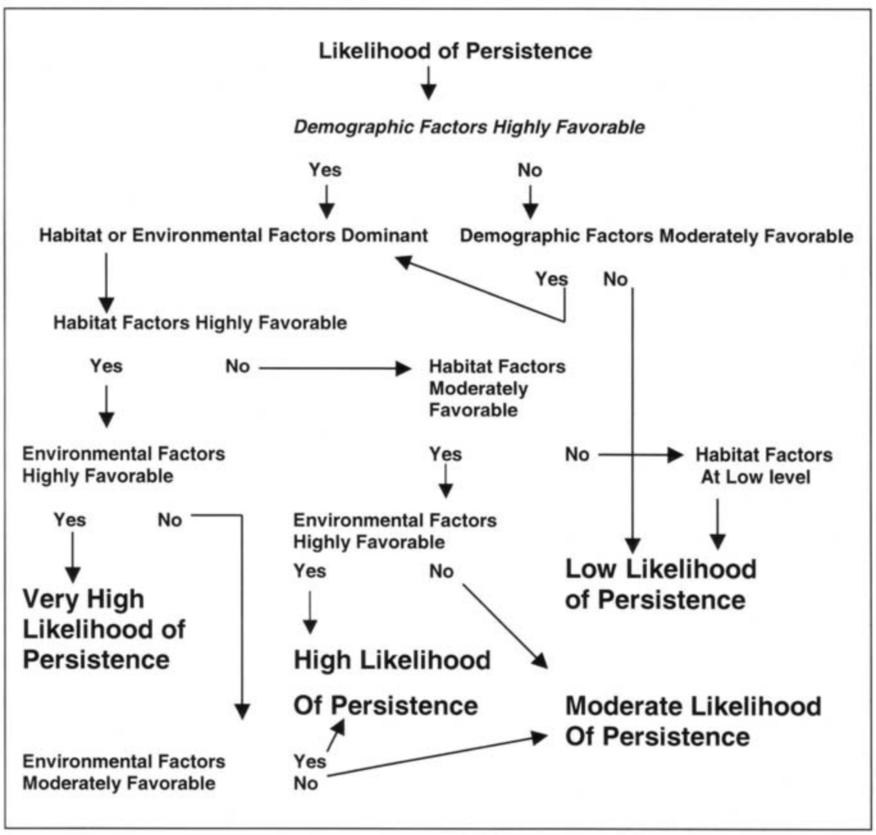


Table III-20 shows the persistence analysis process being used for this analysis.

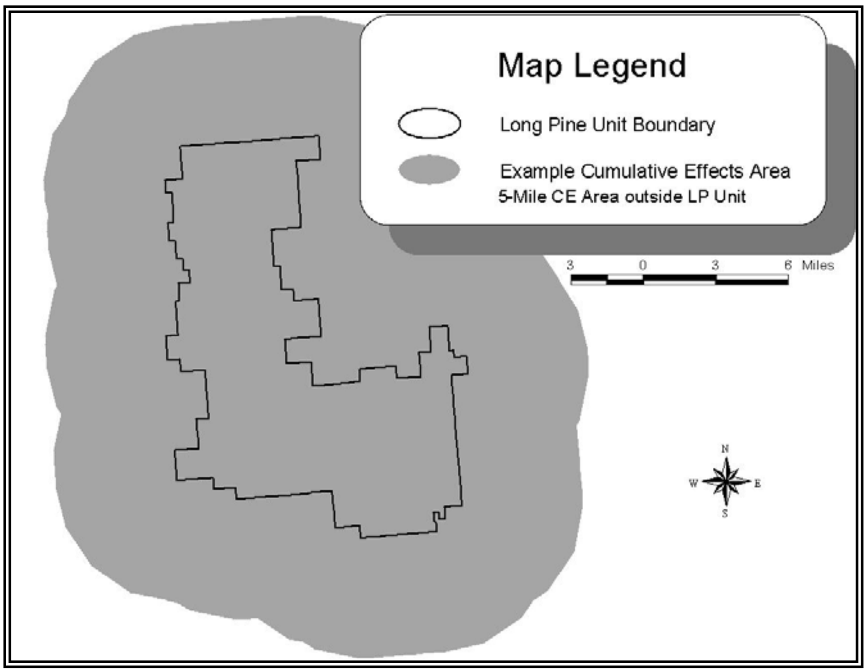
Table III-20: Criteria used to identify whether factors are low, moderate, or highly favorable.

Factor	Feature	Low Persistence	Moderate Persistence	High Persistence
Demographic	Population Distribution *(Province to Domain Scale)*	Species is endemic to a section (unit within the National Hierarchical Framework). Single disturbances could affect major portions of species range	Species is endemic to one or more provinces. Disturbances could affect portions of a species range.	Species is well distributed across one or more domains. Disturbances would not likely affect substantial portions of a species range.
	Isolation *(Landscape to Province)*	Populations are isolated and do not interact with other populations.	Populations are distributed such that interaction between populations is possible (See example 1 above).	Populations are well distributed in such a way that dispersal not disrupted.
	Survival *(Landscape to province scale)*	Mortality, particularly human caused, is a big factor in affecting species survival.	Mortality, particularly human caused, has an effect on species persistence, but does not threaten survival	Mortality, particularly human caused, is not a factor affecting species persistence.
	Reproduction *(Landscape to province scale)*	Species has low natural reproductive potential.	Species has a moderate natural reproductive potential.	Species has a high natural reproductive potential.
Habitat	Quality *(Landtype to landscape scale)*	Habitat parameters such as tree size and snag size meet minimum requirements. Small changes in structure at the stand level results in habitat rendered unsuitable.	Habitat parameters exceed minimum levels however, small changes renders habitat minimally suitable.	Habitat parameters easily exceed suitability requirements such that small changes do not render habitat unsuitable or minimally suitable.
	Quantity *(Landtype or landscape scale)*	The amount of habitat barely meets minimum requirements for establishment of territories or to provide for dispersal. Small changes in the amounts of habitat render areas unsuitable.	The amount of habitat exceeds minimum amounts, however, small changes in the amount of habitat renders areas minimally suitable or unsuitable.	The amount of habitat greatly exceeds minimum levels such that small disturbances do not render habitat minimally suitable or unsuitable.
	Distribution *(Landtype or landscape scale)*	Habitat is distributed across the landscape at maximum juvenile dispersal distances. Pockets of isolated habitat exist. Minor disturbances likely result in increased population isolation.	Habitat is distributed across the landscape within maximum juvenile dispersal distances. Pockets of isolated habitat are rare. However, minor disturbances likely result in increased population isolation.	Habitat is distributed across the landscape at optimum levels for juvenile dispersal and few if any isolated patches exist. Minor and even major disturbances are not likely to result in substantial population isolation across the planning area.
Environmental	Disturbance Extensiveness	Fire hazards (fuel loads, tree densities, tree species composition) and other hazards are extensive and contiguous across the planning area.	Fire hazards and other hazards are not extensive or contiguous across the analysis area. Areas of high hazard are broken by vegetation of lesser hazard or by natural features.	Hazards are not extensive and contiguous. Landscapes are diverse, reflecting natural conditions.
	Historical comparison of disturbances	Disturbances are outside historical levels, in terms of their size, severity or intensity, and are likely wide spread across the analysis area.	Disturbances outside historic levels are not likely, however, management strategies and successional trends lead to a high likelihood of disturbances outside historic levels across a large portion of the landscape within the next 10-20 yrs.	Disturbances outside historic levels are possible but not likely because vegetation within the management area have been managed within historic levels as well.

The persistence rating is a qualitative rating and such, is not a precise determination. Of greater importance is the change in persistence and the rationale for that change. An increase in persistence from a low to moderate indicates that habitats are less isolated, or the amount or quality of habitat is improved, or that the risks to existing habitat are reduced.

If any measurable impacts from implementation of the project are expected, cumulative impact areas will be defined and described individually. Figure III-10 displays an example of what a cumulative effects area would look like and that could be used in the analysis. Past and present activities were considered when describing the existing condition, but may incrementally add to cumulative impacts. Many foreseeable future projects are expected to occur within this 5-mile radius in the next 5 years. In addition to grazing, the ones analyzed are summarized listed in Section 3.13 and are listed in detail in Appendix C.

Figure III-10: Cumulative Effects Analysis Area for Wildlife



Species that haven't been documented to exist and have habitat within the project area are speculated to be present within the project area, with no information on estimated numbers of individuals and existing persistence ratings are estimated based primarily on habitat quantity and condition.

The Long Pine (LP) Unit was historically an elevated forested/grassland island surrounded by flatter, lower elevation, dry grassland, and agricultural lands with a few woody draws. Currently, much of the LP Unit is in a grass/forb structural stage, due to the Brewer Fire of 1988 and the Kraft Springs Fire of 2002. Most of the forested stands that remained following the Brewer Fire burned in late 2002. There is little unburned forested habitat remaining within the LP Unit, about 9 percent of the area.

The closest forested area capable of providing sufficient habitat for many forest dependant species is in the Ekalaka Hills, about 6 miles northwest of the Long Pins Land Unit. Because stand exams have not been conducted following the Kraft Springs Fire, specific information regarding the remnant green trees within the project area are primarily unknown. An attempt was made to use new aerial photos to help quantify the existing condition into basic habitat categories.

Table III-21 through Table III-24 display the Federally listed and proposed species, Regional Forester's Sensitive Species of known or expected to exist species on the Custer National Forest, Habitat Indicator Species (otherwise known as Management Indicator Species (MIS)), and Key Wildlife Species. This table also indicates whether or not the species is likely to have habitat within the project area for some portion of its life cycle. If the species does not exist, does not contain habitat within the project area, or could not be impacted by the proposed activities in any way, the existing persistence rating is low within the project area, no impacts or change in persistence rating would occur as a result of any alternative selected and will not be discussed further in this document.

Table III-21: T, E. Listed and Proposed Wildlife Species

Species*	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Bald Eagle	No	Yes	Nesting structure near a large water-body (lake or river) to provide sufficient forage
Mountain Plover	No	No	Flat, sparse, short-grass prairie
Black-footed Ferret	No	No	Large complexes (6,000 – 7,500 acres) of occupied prairie dog colonies (>100 acres)
Grizzly Bear	No	No	Remote, well connected forested generalist
Gray Wolf	No	No	Remote, well connected forested generalist
Lynx	No	No	Spruce/fir, high alpine, specialist

*Species that have no habitat within the project area (column 2) or have not been documented within the cumulative effects area (column 3) are considered to have a low persistence rating and would not be impacted by this project in any way. They will not be discussed further in this document.

Table III-22: Sensitive Wildlife Species

Species*	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Peregrine Falcon	No	No	Cliff habitat over 200 feet high with suitable ledges for nest construction
Northern Goshawk	Yes	Yes	Mature forest generalist
Burrowing Owl	Yes	No	Open grasslands, nesting and roosting in burrows dug by mammals or owls
Flammulated Owl	No	No	Open ponderosa pine or mixed conifer forests primarily in the Rocky Mountain portions of western states (Not in eastern Montana) – secondary cavity obligate
Sage Grouse	No	No	Large areas of mature sagebrush w/ small openings
Greater Prairie Chicken	No	No	Prairie grasslands and shrublands

Table III-22: Sensitive Wildlife Species

Species*	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Harlequin Duck	No	No	Swift flowing rivers w/ adequate prey
Baird's Sparrow	Yes	Yes	Prairie grasslands
Sprague's Pipit	Yes	No	Prairie grasslands
Loggerhead Shrike	Yes	No	Grassy pastures that are well grazed – Nests in shrubs or small trees, preferably thorny such as hawthorn
Black-backed Woodpecker	Yes	No	Primary habitat is recently burned forested areas, secondary habitat is spruce/fir forests
Townsend's Big-eared Bat	Yes	No	Cave and cave-like structures along with forested foraging habitat
Pallid Bat	No	No	Arid deserts and grasslands w/ rock outcrops in western states (Eastern Montana is outside of known range (Chung-MacCoubrey 1999))
Spotted Bat	No	No	Desert to montane coniferous forests – (Eastern Montana is outside of known range (Chung-MacCoubrey 1999))
White-tailed Prairie Dog	No	No	Xeric sites with mixed stands of shrubs and grasses from the Bighorn basin in Montana south to Utah
Black-tailed Prairie Dog	Yes	Yes	Relatively flat grasslands throughout the central plains
Northern Bog Lemming	No	No	Sphagnum bogs, wet meadows, moist mixed and coniferous forests
Bighorn Sheep	No	No	Remote, steep, rugged terrain, such as mountains, canyons, and escarpments where precipitation is low and evaporation is high
Fisher	No	No	Mature to over-mature grand fir, mixed fir, spruce/fir, and sub-alpine fir forests
Wolverine	No	No	Remote subalpine and spruce/fir forested areas
Tawny Crescent Butterfly	No	No	Moist meadows and pastures – Not found in this part of Montana (USGS 2002)
Regal Fritillary Butterfly	No	No	Tall-grass prairies – Not found in this part of Montana (USGS 2002)
Dakota Skipper Butterfly	No	No	Not found in Montana (USGS 2002)
Belfragi's Chlorochroan Bug	No	No	Not found in Montana (NatureServe 2001)
Boreal Toad	No	No	Spruce/fir and alpine meadows
Northern Leopard Frog	Yes	Yes	Riparian and wetland areas
Sturgeon Chub	No	No	Heavily turbid medium to large rivers
Yellowstone Cutthroat Trout	No	No	Upper Yellowstone and upper Snake River drainages.

*Species that have no habitat within the project area (column 2) or have not been documented within the cumulative effects area (column 3) are considered to have a low persistence rating and would not be impacted by this project in any way. They will not be discussed further in this document.

Table III-23: Management Indicator Species (MIS) - Wildlife

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Northern Goshawk	Yes	Yes	Mature forest generalist
Ruffed Grouse	No	No	Primary habitat includes dense early seral staged forests dominated by aspen – Secondary habitat includes other dense deciduous or conifer woodland areas
Sharp-tailed Grouse	Yes	Yes	Mosaic of dense grass and shrubs with forbs and insects for nesting, woody riparian areas in winter
Western Kingbird	Yes	Yes	Open and partially open country with scattered trees, including agricultural lands
Lark Sparrow	Yes	Yes	Open areas with scattered brush or trees
Northern Oriole	Yes	No	Open deciduous woodland and riparian areas
Yellow Warbler	Yes	Yes	Brushy riparian especially with willows
Ovenbird	Yes	Yes	Mid-late successional, closed-canopied deciduous or deciduous/conifer forests with limited understory
Rufous-sided (Spotted) Towhee	Yes	Yes	Shrubby riparian areas, woody draws, and woodland undergrowth
Brewer's Sparrow	Yes	No	Strongly associated with sagebrush, but also uses other areas with scattered shrubs and short grasses
White-tailed Deer	Yes	Yes	Grassland to montane conifer forest
Cutthroat Trout (Native Species)	No	No	Covered in Sensitive Species Section
Largemouth Bass	No	No	Warm Freshwater areas with beds of aquatic vegetation that have been stocked – (Exotic species to Montana)

[1]Species that have no habitat within the project area (column 2) or have not been documented within the cumulative effects area (column 3) are considered to have a low persistence rating and would not be impacted by this project in any way. They will not be discussed further in this document.

Table III-24: Key Wildlife Species

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Golden Eagle	Yes	Yes	Open hilly or mountainous areas
Merlin	Yes	Yes	Patchy shrub/grassland habitats with large trees to support nesting (Secondary nester)
Sharp-tailed Grouse	Yes	Yes	Covered in MIS Section
Elk	Yes	Yes	Grassland to forested alpine areas
Mule Deer	Yes	Yes	Rugged grassland to forested alpine areas
White-tailed Deer	Yes	Yes	Covered in MIS Section
Big Horn Sheep	No	No	Covered in Sensitive Species Section
Pronghorn Antelope	Yes	Yes	Grassland to montane conifer forest

Table III-24: Key Wildlife Species

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	Basic Habitat Description
Yellowstone Cutthroat Trout	No	No	Covered in Sensitive Species Section
Turkey (In MA D only)	Yes	Yes	Woody draws to montane conifer forest

[1] Species that have no habitat within the project area (column 2) or have not been documented within the cumulative effects area (column 3) are considered to have a low persistence rating and would not be impacted by this project in any way. They will not be discussed further in this document.

3.5.4.1 SUMMARY OF EFFECTS ON ALL WILDLIFE SPECIES

This section will provide a summary discussion of effects and several tables (Table III-25 through Table III-28) showing the list of species considered and the effect determinations for each species by alternative. In addition, the existing persistence rating and expected trend will be displayed in these tables for species expected to be impacted by one or more of the analyzed alternatives. All wildlife species are discussed in detail in the separate wildlife Biological Assessment (BA) for Listed Species, and the wildlife report for Sensitive, MIS, and Key Wildlife species. These wildlife documents are found in the project record files.

Implementation of any alternative in conjunction with Project Design Features would not violate any law, regulation, policy, or Forest Plan Standard or Guideline with regard to analyzed wildlife species. Alternative 3 would be expected to have the least amount of adverse impacts and provide the most beneficial long-term habitat improvements of all the alternatives brought forward. Alternative 2 would be expected to have more adverse impacts than Alternative 3 because of the additional human related activities and noise, in addition to conversion of habitat into temporary roads. Implementation of Alternative 1, the “No Action” alternative would be expected to produce the fewest short-term adverse impacts to all species, but it would leave the project area in the poorest condition for most species that have habitat there. Alternative 3 has the best mix of short-term risk for long-term gain for the wildlife resource.

No Federally listed Threatened, Endangered, or Proposed species would be expected to have any impacts, including cumulative impacts, resulting from full implementation of any of the alternatives (See Table III-25).

Table III-25: T&E Listed and Proposed Wildlife Species, Effects of the Alternatives

Listed Species	Alternative 1	Alternative 2	Alternative 3
Bald Eagle	No Affect	No Affect	No Affect
Mountain Plover	No Affect	No Affect	No Affect
Black-footed Ferret	No Affect	No Affect	No Affect
Grizzly Bear	No Affect	No Affect	No Affect
Gray Wolf	No Affect	No Affect	No Affect
Lynx	No Affect	No Affect	No Affect

Eight (8) of the 28 Region 1 Sensitive Species (Table III-26) would be expected to have some adverse impacts to individuals or their habitat with implementation of any action alternative. No impacts to Sensitive Species would be expected with implementation of Alternative 1 (No Action) with the exception of black-backed woodpeckers and Townsend's big-eared bats. The Northern goshawk, burrowing owl, Baird's sparrow, Sprague's pipit, loggerhead shrike, blacked-back woodpecker, and Townsend's big-eared bat would be expected to have some adverse impacts to individuals or their habitat with implementation of any action alternative, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species. The black-tailed prairie dog is expected to have these same findings, but only for Alternative 2. None of these species would be expected to have a reduction of persistence within the project area with full implementation of Project Design Features, with the exception of black-backed woodpeckers that would be expected to decrease under any alternative. The remainder of the Region 1 Sensitive Species are expected to have no impact from implementation of any alternative, primarily because habitat does not exist within the project area or area of influence.

Alternatives 2 and 3 are expected to have incremental adverse cumulative impacts on Northern goshawk, burrowing owl, Baird's sparrow, Sprague's pipit, loggerhead shrike, black-backed woodpecker, Townsend's big-eared bat, black-tailed prairie dog, and/or their habitats. However, these adverse cumulative impacts would not be expected to result in any substantial change in numbers of individuals or substantial changes in habitat conditions. Specific cumulative impacts are disclosed for each species in the Wildlife Report, located in the project record.

Table III-26: Sensitive Wildlife Species, Effects of the Alternatives

Sensitive Species	Alternative 1	Alternative 2	Alternative 3
Northern Goshawk	NI[1], Low[2] →[3]	MIIH, Low →	MIIH, Low →
Burrowing Owl	NI, Low →	MIIH, Low →	MIIH. Low →
Baird's Sparrow	NI, Low ↑	MIIH, Low ↑	MIIH, Low ↑
Sprague's Pipit	NI, Low ↑	MIIH, Low ↑	MIIH, Low ↑
Loggerhead Shrike	NI, Low ↑	MIIH, Low ↑	MIIH, Low ↑
Black-backed Woodpecker	MIIH, High ↓	MIIH, High ↓	MIIH, High ↓
Townsend's Big-eared Bat	MIIH, Low →	MIIH, Low →	MIIH, Low →
Black-tailed Prairie Dog	NI, Low →	MIIH, Low →	NI, Low →

[1] Official Determination – NI = No Impact; MIIH = May Impact Individuals or Habitat
[2] Existing Persistence Rating
[3] Expected Persistence Trend: → = No Change in 15 years or more; ↑ = Improving; ↓ = Declining

Ten (10) of the 13 Custer National Forest Habitat Indicator Species (Management Indicator Species, Table III-27) would be expected to have some impacts to individuals or habitat with implementation of one or more of the alternatives. Implementation of Alternative 1 (No Action) would have the fewest adverse impacts to species and their habitats, but would result in very limited beneficial impacts. Both of the action alternatives would be expected to have limited adverse impacts to all ten species with habitat in the project area: the Northern goshawk (also listed as Sensitive), sharp-tailed grouse, Western kingbird, lark sparrow, Northern oriole, yellow warbler, ovenbird, rufous-sided (spotted) towhee, Brewer's sparrow, and white-tailed deer. The persistence rating for white-tailed deer would be expected to increase from low to moderate immediately with implementation of either action alternative, because of a substantially reduced vulnerability to human caused mortality. The rest of these species would be expected to maintain their existing and expected future persistence rating with implementation of Alternative 2 or 3, and Project Design Features. The remainder of the MIS would be expected to have no impact from implementation of any alternative, because habitat does not exist within the project area or area of influence.

Alternatives 2 and 3 are expected to have incremental adverse cumulative impacts on Northern goshawk, sharp-tailed grouse, Western kingbird, lark sparrow, Northern (Bullock's) oriole, yellow warbler, ovenbird, rufous-sided (spotted) towhee, Brewer's sparrow, white-tailed deer, and/or their habitats. However, these adverse cumulative impacts would not be expected to result in any substantial change in numbers of individuals or substantial changes in habitat conditions. Specific cumulative impacts are disclosed for each species in the

Table III-27: Habitat Indicator Species (MIS) – Wildlife, Effects of the Alternatives

MIS Species	Alternative 1	Alternative 2	Alternative 3
Northern Goshawk	Low[1] →[2]	Low →	Low →
Sharp-tailed Grouse	Low ↑	Low ↑	Low ↑
Western Kingbird	Moderate →	Moderate →	Moderate →
Lark Sparrow	Low ↑	Low ↑	Low ↑
Northern (Bullock's) Oriole	Low →	Low →	Low →
Yellow Warbler	Low ↑	Low ↑	Low ↑
Ovenbird	Low ↑	Low ↑	Low ↑
Rufous-sided (Spotted) Towhee	Low ↑	Low ↑	Low ↑
Brewer's Sparrow	Low ↑	Low ↑	Low ↑
White-tailed Deer	Low→	Mod ↑	Mod ↑

[1] Existing Persistence Rating
[2] Expected Persistence Trend: → = No Change in 15 years or more; ↑ = Improving; ↓ = Declining

Eight (8) of the 10 Key Wildlife Species would be expected to have some impacts from implementation of one or more of the alternatives. Implementation of Alternative 1 (No Action) would have the fewest impacts, both adverse and beneficial. This alternative would maintain extreme vulnerability to human caused mortality for all game species, deer, elk, turkeys, and to a lesser degree grouse. The action alternatives may result in short-term adverse impacts to all eight species with habitat in the project area, but the expected long-term habitat improvements would substantially outweigh the potential short-term impacts to these species. In addition, implementation of either action alternative would immediately improve the persistence ratings of white-tailed deer, mule deer, and elk from the existing low rating to moderate. These alternatives would result in maintaining the existing and expected future persistence ratings for Sharp-tailed grouse, golden eagle, merlin, and turkey. All alternatives are expected to reduce the persistence rating for pronghorn from moderate to low, but historically it has always been low. The Kraft Springs fire temporarily improved the rating due to the uncharacteristic stand-replacing event.

Alternatives 2 and 3 are expected to have incremental adverse cumulative impacts on sharp-tailed grouse, white-tailed deer, golden eagle, merlin, elk, mule deer, pronghorn antelope, turkey, and/or their habitats. However, these adverse cumulative impacts would not be expected to result in any substantial change in numbers of individuals or substantial changes in habitat conditions. Specific cumulative impacts are disclosed for each species in the Wildlife Report, located in the project record.

Table III-28: Key and Other Wildlife Species – Effects of the Alternatives

Key Wildlife Species	Alternative 1	Alternative 2	Alternative 3
Sharp-tailed Grouse	Low[1] ↑[2]	Low ↑	Low ↑
White-tailed Deer	Low →	Moderate ↑	Moderate ↑
Golden Eagle	Moderate →	Moderate ↑	Moderate ↑
Merlin	Moderate →	Moderate ↑	Moderate ↑
Elk	Low →	Moderate ↑	Moderate ↑
Mule Deer	Low →	Moderate ↑	Moderate ↑
Pronghorn Antelope	Moderate ↓	Moderate ↓	Moderate ↓
Turkey	Low ↑	Low ↑	Low ↑
Other Species	**Alternative 1**	**Alternative 2**	**Alternative 3**
Neotropical Birds	Limited Impact	Limited Impact	Limited Impact

[1] Existing Persistence Rating
[2] Expected Persistence Trend: → = No Change in 15 years or more; ↑ = Improving; ↓ = Declining

3.6 RARE PLANTS

3.6.1 INTRODUCTION

This section is a summary of the Biological Evaluation (BE) for sensitive plant species. The complete BE document is in the project record.

Activities considered in the proposed project environmental analysis require a Biological Evaluation (BE) per Forest Service Manual direction (FSM 2672.2). The Biological Evaluation is completed to ensure that proposed actions:

- Do not cause US Forest Service Sensitive species to move toward Federal listing
- Do not contribute to the loss of viability of native or desired non-native species

The Forest Service current management objectives for Sensitive Species are in Forest Service Manual (FSM 2670.32). The management objectives are:

- To comply with the requirements of the Endangered Species Act that actions of Federal agencies not jeopardize or adversely modify critical habitat of Federally listed[5] or proposed species.
- To provide a process and standard by which to ensure that threatened, endangered, proposed and sensitive species receive full consideration in the decision-making process.
- To ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native species or to a trend toward Federal listing.

Sensitive Species are defined by the Regional Forester (FSM 2670.5) as those species for which population viability is a concern, as evidenced by:

- Significant current or predicted downward trends in population numbers or density.
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

3.6.2 AFFECTED ENVIRONMENT

One known site for one sensitive plant species *(Asclepias ovalifolia)* was found in the project area from previous field surveys. One other species of sensitive plant is known from outside

[5] Note: Plants that are Listed Threatened, Endangered, or Proposed Species by the U.S. Fish and Wildlife Service would be discussed in a separate document (Biological Assessment for Threatened, Endangered, and Proposed Plant Species. There are no FWS Listed species for the project area, and therefore no BA for plants was prepared.

the project area. These two species are considered as having the highest probability for occurrence within the project area.

Table III-29 displays the list of sensitive plant species for the Sioux Ranger District-Custer National Forest. Those species that have documented sites, or have the potential to occur in the project area are noted in the table and will be discussed in the environmental effects section.

Table III-29[1] Custer National Forest Sensitive Plants List or Sioux RD[2]

Scientific Name	Common Name	Habitat	Known Locations	Analyzed for project area?
Asclepias ovalifolia	Ovalleaf milkweed	Sandy, gravelly or clayey soils of prairies and woodlands. Elevation 3,760-3,840 feet.	Known in Long Pines Unit below Icebox Spring; within project area perimeter	Yes
Carex gravida var. gravida	Pregnant sedge	Open woods, often in ravines with deciduous trees, on the plains. Elevation 3,880-4,000 feet.	Not known from Long Pines or project area; however, potential habitat is thought to be in the Long Pines Unit. Closest site is on Ashland RD - East Fork Otter Creek; Hay Creek, approx. 150 air miles from Long Pines	Yes
Eriogonum visherii	Dakota buckwheat	Barren, often bentonitic badlands slopes and outwashes in the plains. Elevation 3,140-3,760 ft.	Not known from Long Pines or project area. Closest site is Slim Buttes - Irish Butte (S. of Mtn Ranch Sp. #1); approx. 30 air miles from Long Pines	No
Gentiana affinis	Prairie gentian	Wet meadows, shores, springs, seepage areas and low prairie. Elevation 5,870-9,740 feet.	Not known from Long Pines or project area. Closest known site was Collected in 1910 from Cave Hills. That area was extensively surveyed in 1994. No plants found. Site is 30 air miles from Long Pines	No
Mertensia ciliata	Mountain bluebells	Forested slopes-damp thickets in course to medium textured soils. Valley bottoms associated with springs, seeps, and spring fed watercourses. Intermediate shade tolerance. Very drought intolerant. Its Slim Butte population is located on the lower slope of a steep north-facing slope. Usually occurs in wetlands, but occasionally found in non-wetlands. Elevation 5,500-13,000 feet.	Not known from Long Pines or Project Area. Closest known site in Tepee Canyon of Slim Buttes; and West Short Pines – 1912 Collection; approx. 30 air miles from Long Pines Unit	No

[1] Source: Sensitive Plant Assessment, Kraft Spring Fire BAER Report. Sept. 11, 2002.

[2] *Astragalus barrii* and *Mentzelia pumila* have been removed from the USFS R1 Sensitive Plant List via pers. comm. with Steve Shelly and MT. Natural Heritage Database, June 2002.

3.6.3 ENVIRONMENTAL EFFECTS

Only those plant species noted in the previous table as having known sites or suspected habitat within the project are discussed in this section. The environmental consequences section will focus on any effects on the sensitive plant resource by implementation of the activities proposed in the Kraft Springs project area. After evaluating the potential for effect, a determination statement (finding) is used to describe the impacts on the rare plant resource.

3.6.3.1 NO ACTION ALTERNATIVE

No adverse direct, indirect, or cumulative effects would occur on any Sensitive plant species from the No-Action alternative. No ground disturbing activities would occur; however, existing and ongoing uses of the project area would still occur, including recreation, grazing, firewood cutting, and many other uses. Although the effects of the 1988 Brewer Fire and the 2002 Kraft Springs Fire on sensitive plants is unknown, it is probable that in the event of a large stand replacing wildfire, adverse impacts could impact native plant populations and communities, including rare species, through soil, habitat, and watershed damage that could occur.

3.6.3.2 ALTERNATIVES #2 AND #3

A determination finding for each species is noted by alternative in Table III-30. A discussion for each plant species analyzed for the project area and rational for the determination statement follows. The complete discussion is found in the biological evaluation document in the project files.

Table III-30: Summary of Sensitive Plant Species and Determination Statements by Alternative

Species Name	Alternative #1 No Action	Alternative #2 Proposed Action	Alternative #3
Asclepias ovalifolia Ovalleaf milkweed	NI (short-term) UK long-term	MIIH[1]	MIIH
Carex gravida v. gravida Pregnant sedge	NI (short-term) UK long-term	MIIH	MIIH

[1] Options in determination of effects: (1) NI = No impact; (2) MIIH = May impact individuals or habitat, but is not likely to cause a trend to Federal listing or loss of viability; UK= Unknown impacts.

Asclepias ovalifolia (Ovalleaf milkweed)

Distribution is Northern Great Plains to Wisconsin and Illinois. Documented in North and South Dakota, Montana and Wyoming for FS Region 1. Habitat is sandy, gravelly or clay soils of prairies and woodlands, or open pine woodland in seasonally moist meadows from 3,700 – 3,900 ft. Flowering period is July-August.

This is a medium sized plant (to 2 feet) with upright stalks and oval leaves. Plants are spread by rhizomes and the flowers have 5-petals, greenish-white or yellow to greenish-purple.

Similar species include *A. viridiflora* and *A. speciosa*, but the former lacks horns with the hoods, and the latter has pink to purple flowers. Oval-leaf milkweed has low palatability to livestock but is susceptible to tramping. Effects of fire are unknown.

One documented site is known for the Long Pines Land Unit and is within the project boundary. No project activities would impact the known site. Other unknown potential habitat may exist in the project area; and project activities such as temp road construction could impact the habitat for this species. However, any potential impacts would be restricted to minor areas affected by temporary road construction and should not be significant.

Therefore, a determination of: may impact individuals or habitat, but not likely to cause a trend toward Federal listing or a loss of viability is warranted.

Carex gravida v. gravida (Pregnant sedge)

This species is a grass-like plant with triangular stems inhabiting moist areas on hillslopes, and in swales and drainage ways. The plant community is located in an opening adjacent to trees and is composed of grasses, forbs, and grass-like plants. The soils are deep and medium textured.

There are no documented sites in the Kraft Springs Project area; however, there are two documented sites on the adjacent Ashland Ranger District (150 miles west of project area). Potential habitat is widespread in the Long Pines Land Unit and within the Kraft Springs project area. Survey reconnaissance did not find any new populations or sites, but potential habitat would be affected by project activities, including road construction and logging.

Project impacts are not thought to be significant due to the limited activities proposed for woody draws and other mesic habitats. Woody draws would have buffers protecting from fuels reduction operations and would not be affected. However, the occasional crossing of potential habitat by temporary roads may impact some unknown habitat or populations.

Therefore, a determination of: may impact individuals or habitat, but not likely to cause a trend toward Federal listing or a loss of viability is warranted.

3.6.4 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the rare plant resource from past, present, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.6.4.1 DISCUSSION

Impacts from the project activities on sensitive plants are not considered to be significant. Other activities affecting sensitive plants include ongoing livestock grazing on several allotments. Improper range use by livestock has the most likelihood of cumulative impacts on the sensitive plant resource, because range use is concentrated in the potential habitat for sensitive plants (open dry grass sites, seasonal meadows or woody draws). Ongoing recreational use such as hunting, wood cutting and camping would not have any cumulative effects on sensitive plants.

3.7 RANGE RESOURCE

3.7.1 INTRODUCTION

The Range Resources section will discuss management direction, current conditions, and environmental consequences of the proposed alternatives on the range resource, which also includes the noxious weed discussion and the woody draw resource areas. The analysis area for the range resources discussion will be the entire Long Pines Land Unit.

3.7.2 AFFECTED ENVIRONMENT

3.7.2.1 RANGE

There are fifteen (15) grazing allotments permitted to for approximately 28,000 AUMs (Animal Unit Months) within the project area. All allotments are cattle (cow/calf) permits.

Table III-31 lists the allotments in the Long Pines land unit and the Kraft Springs Project area.

Table III-31: Livestock Allotments in the Kraft Springs Project Area and Long Pines Land Unit

Allotment Name	Allotment Acres	Permitted AUMs
Belltower	4350	1450
Brewer	4380	1150
Burditt	2665	1542
Byrne	1550	1502
Capitol Rock	9200	5014
Carter	11030	4247
Catron-Pendleton	9950	3028
Devils Creek/Neece	3390	1516
Gross	1360	317
Kennedy	775	288
Lampkin Gulch	2500	1159
Moody	1900	1491
South Snow Creek	2075	879
Summers	2570	919
Wood Gulch	6120	2191

Range analysis surveys were completed in the Long Pines Land Unit area in 1962, 1965, 1966, 1968, and 1975. They showed the area to be in a fair to good vegetative condition with an upward trend and a good to excellent soil condition with an upward trend. Some of these transects were re-read in 1995[6] and showed the majority of the area to be in a good vegetative condition with an upward trend and an excellent soil condition with an upward trend.

Kraft Springs Fire[7]: changes in the range affected environment

The Kraft Springs fire affected portions of 13 Forest Service grazing allotments and affects approximately 30 permit holders. There are about 153 miles of fences, 17 stockwater dams, and 71 water developments within the fire perimeter that experienced varying degrees of damage. The Kraft Spring Fire will have short-term impacts to livestock management on the Brewer, Burditt, Capitol Rock, Carter, Catron/Pendleton, Devil's Creek/Neece, Lampkin Gulch, Moody, Plum Creek, South Snow Creek, Summers, and Wood Gulch Allotments. Allotments in the Long Pines that did not burn include Belltower, Byrne, Gross, Kennedy, and Summers. About 96 miles of fence will need varying degrees of repair or replacement in order to exclude livestock from entering the burned area from adjacent private lands and adjacent unburned grazing lands under permit. In addition, there are approximately 57 miles of interior fences that are in need of repair or replacement after the Kraft Springs fire. Future project funding is being requested to accomplish the needed rangeland fence repairs. Grazing deferments for two years may be implemented for some allotments to allow the area to recover.

Although the fire generally was of high intensity effects on the vegetation, the fire severity on soil properties was low across approximately 95 percent of the burn area with little or no water repellency. Approximately 5 percent of the burn area experienced high severity effects on soil properties, including moderate amount of water repellency. Live plant crowns (portion of plants at the soil surface) were abundant in 75 percent of FS portions of the burn. This indicates the ability of the majority of the area having the ability for more rapid natural recovery for ground cover with grasses within one to three years. With deferment, the burn will release a flush of nutrients into the soil that may increase production of recovered grasslands for up to five years, depending on pre-existing conditions and precipitation events. With livestock deferment, hardwood draws and aspen stands are expected to have prolific sprouting.

3.7.2.2 NOXIOUS WEEDS

The information on noxious weeds in the Long Pines Land Unit and the Kraft Springs Project area is incomplete. To improve the available information about noxious weed species and infested acres in the Long Pines Land Unit, the Custer National Forest has contracted with a private contractor to map noxious weeds in the Long Pines Land Unit. This will include all of the project area. This inventory is ongoing and should be completed during the 2002-2003 field seasons. Additional inventory, monitoring, and control activities are planned for 2003-2004 in the Kraft Springs Fire area.

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[6] Transect Cluster and Condition Rating Summary prepared by Stradinger and Kellogg, Sioux RD. 1995

[7] Source: Rangeland Management Report, BAER Kraft Springs Fire. Sept. 11, 2002. Kim Reid, Forest Range Program Manager.

Most of the Kraft Springs project area falls within Carter County, Montana, while a small <5% amount of acres are within Harding County, South Dakota. After assessing those species recognized by the counties and the U.S. Forest Service, a list was compiled of species of greatest concern with regards to impacts on ecosystem integrity for the Kraft Springs Project area (See Table III-32).

Table III-32: Noxious Weed Species of Concern

Scientific Name[8]	Common Name
Centaurea biebersteinii (C. maculosa)	spotted knapweed
Cirsium arvense	Canada thistle
Cynoglossum officinale	hound's-tongue
Euphorbia esula	leafy spurge

In the Kraft Springs Project there is approximately 30 acres of known noxious weed infestations. The most abundant and widely distributed noxious weed species is Canada thistle, most resulting from the disturbance created by the 1988 Brewer Fire and subsequent activities. Canada thistle occurs along most of the roads, around range improvements, and in other disturbed sites. Not as abundant, but of great concern, are hound's tongue and spotted knapweed. Spotted knapweed is not widespread in the project area, but a few scattered populations have been found. Small infestations of leafy spurge are located in Wickham, Atlantis, and other drainages. Many of these known infestations occur along roads, near dozer lines, and in recreational areas such as campgrounds. These areas can be vectors for weed spread.

Kraft Springs Fire: changes in noxious weed affected environment

For most noxious weed species identified in the Kraft Spring Fire area, disturbed sites and dry potential vegetation types are the most at risk from invasion and spread. Disturbed areas would be roads, gravel pits, dispersed recreation sites, livestock spring developments and where ground disturbing fire suppression actions occurred (dozer lines, hand lines, helispots, safety zones, and drop points). Burned sites can have altered soil structure and reduced organic matter content creating a more favorable germination substrate for weed seeds. Finally, undisturbed areas in drier vegetation types are also at risk. This is because many of our noxious weed species have evolved in dry Mediterranean climates and are highly competitive under these similar site conditions.

This situation has likely increased the acres of existing populations of noxious weeds and may likely have introduced new species of noxious weeds to the Long Pines Land Unit.

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[8] Nomenclature follows the USDA Plants Database: USDA, NRCS 1999. PLANTS database (http://plants.usda.gov/plants). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Additional field inventories and monitoring surveys for noxious weeds are planned for 2003-2004 in the Kraft Springs fire portion of the Long Pines Land Unit.

3.7.2.3 WOODY DRAWS

There are “woody draws" described as Management Area N, throughout the project area, however most woody draws have not been mapped or inventoried. The most common habitat type in this ecosystem is the green ash/common chokecherry habitat type. In this habitat type the draw bottom is composed of snowberry, kentucky bluegrass, sedge species, green needlegrass, bluebunch wheatgrass, canada wildrye, common spikesedge and various forbs. The mid-layer consists of chokecherry, serviceberry, wild plum, green ash and quaking aspen seedlings and saplings The upper layer consists of mature and pole size green ash, quaking aspen, box-elder, cottonwood and ponderosa pine.

A total of 1.68 miles (21.56 acres) of the woody draws were surveyed in the Carter, South Snow Creek, and Wood Gulch allotments from 1995 - 1998. This survey showed the .66 miles (10.15 acres) (one in Carter and one in Wood Gulch) to be in the late seral stage and the condition is rated as "healthy" (proper functioning condition) with an improving trend. Approximately 1.02 miles (11.41 acres) (in South Snow Creek and in Wood Gulch) are in a mid-seral stage and the condition is rated to rated as "At Risk" with an upward trend. Table III-33 displays the woody draw condition estimates for each allotment.

Table III-33: Woody Draw Condition of Livestock Allotments in Project Area

Allotment Name	Unhealthy Non-functioning	At Risk-Functioning	Healthy Proper Functioning Condition
Byrne	na	na	na
Carter			.29 miles (2.25 acres)
Devils Creek/Neece	na	na	na
Kennedy	na	na	na
Lampkin Gulch	na	na	na
South Snow Creek		.64 miles (11.21 acres)	
Wood Gulch		.38 miles (6.2 acres)	.37 miles (7.9 acres)

Kraft Springs Fire: changes in woody draw affected environment

The Kraft Springs Fire affected many acres of woody draws with high, moderate, or low intensity wildfire. Lower intensity wildfire has a positive effect on woody draws by reducing pine seedling invasion and causing woody shrubs to resprout. However, high intensity fire may have adverse impacts on woody draws and recovery can be much slower. The actual impacts of the Kraft Springs fire on woody draws is not yet known; however, monitoring is proposed for 2003-2004 in conjunction with monitoring livestock grazing use in woody draws.

3.7.3 ENVIRONMENTAL EFFECTS - ALTERNATIVE 1: NO ACTION

3.7.3.1 RANGE

Current grazing practices would continue on all livestock allotments in the project area. However, due to the 2002 Kraft Springs fire, a two-year deferment of some grazing allotments may be implemented. Ongoing range improvement, reconstruction and maintenance would continue, and would be increased due to the fire. The No-Action alternative will have no direct impact to the range resource in the short-term; however, as dead trees fall to the ground in large numbers, that area will be difficult for livestock to access and the forage for livestock be reduced in the long-term.

Livestock grazing operations are usually adversely affected in the short-term (1-3 years post fire) by the management restrictions designed to protect soil and watershed conditions after a large destructive wildfire. Additionally, livestock grazing improvements such as fences and water developments may be adversely affected by large wildfires. No tree planting would occur and those areas that did not naturally regenerate with trees would remain in a tranistory range condition for many decades and provide increased grazing forage.

3.7.3.2 NOXIOUS WEEDS

Ongoing control of noxious weeds is accomplished by a cooperative approach between the Forest Service and local County weed boards. There is currently an agreement in place between the Custer National Forest and Carter County to use Integrated Pest Management (IPM) practices to control noxious weeds using chemical, mechanical, and biological control measures. Integrated Pest Management practices are implemented to reduce the risk of new noxious weed infestations and control existing noxious weed populations.

Because noxious weeds are spread through biological dispersal methods and also by ongoing human activities such as hunting, grazing, firewood cutting, and other uses of the forest. This would continue to spread noxious weeds of all the current species and possibly introduce new species. There could be an increase in acres infested by noxious weeds even under the No Action alternative. However, the No Action Alternative should not result in any significant increases in acres of noxious weeds in the project area for either the short-term or long-term.

3.7.3.3 WOODY DRAWS

Under the No Action alternative there would be no impact to woody draws and areas would recover naturally from the Kraft Springs fire.

3.7.4 ENVIRONMENTAL EFFECTS - ALTERNATIVE 2: PROPOSED ACTION

3.7.4.1 RANGE

The project activities would positively affect both the short-term and long-term range conditions by reducing the dead conifer density in burned stands, reducing ground fuel loading which restricts livestock movements, and increasing transitory range forage. All these proposed treatments in the Proposed Action would have a positive effect on range conditions and increase available forage for livestock. The fuel reduction activities of this alternative would have a beneficial long-term effect for livestock grazing on approximately 10,890 acres[9]. There would be a temporary loss of forage during the treatment period due to the temporary roads and treatment activities that may cause some displacement of livestock: however, a two-year grazing deferment may be implemented on allotments affected by the fire and those areas may have salvage and fuel reduction treatments completed within that timeframe. Tree planting will only occur on sites that are identified as suitable for timber planting and would return the forested landscape to those areas in several decades. Planting may have some short-term restrictions to prevent seedling losses, however the long-term effects would be limited. As tree sites mature, and prescribed fire is used to maintain the open pine stands, grazing forage on those sites would stabilize.

3.7.4.2 NOXIOUS WEEDS

Activities proposed in the Proposed Action Alternative will likely result in a short-term increase in noxious weeds acres of all known species and may introduce new noxious weed species to the area. Activities such as logging and burning will introduce vehicle and equipment use into areas and create more disturbed soils. Contractors bringing in equipment from other areas have the potential to introduce more infestations of existing noxious weeds and also to introduce new noxious weed species.

Noxious weeds have the potential to increase on the acres proposed for commercial salvage treatment activities, noncommercial fuels treatment acres, along existing roads used for access, 67.0 miles of road improvement, and 20.5 miles of temporary road construction. The actual acres of noxious weed increases that may occur from the Proposed Action is not known, however the potential for an increase in noxious weeds is highly probable, due to the existing populations of noxious weeds that are currently in the project area.

[9] This is based on the acres of commercial and noncommercial treatments. Tree planting acres are not considered for beneficial impacts.

A monitoring study done in the Black Hills National Forest noted that noxious weeds increased an average of 3% of the ground-disturbing activities such as logging, burning and road construction[10]. If the figure of 3% is used for this project area, that would result in an estimated 340 acres[11] of potential new noxious weed infestation in the short-term.

Under this alternative all heavy equipment will be cleaned prior to coming on the project area, seed, straw and other materials used for rehabilitation will be certified weed free and all disturbed roads and landing will be seeded with a certified weed free seed mix after activities occur. All noxious weed infestations will be treated using an Integrated Pest Management approach. This approach could include biological, mechanical, and chemical control methods. All treatment will be accomplished under a Participating Agreement with Carter County. Integrated Pest Management procedures and mitigation measures should manage to control the increase in noxious weeds in the long-term, however increases in noxious weed infestation may occur in the short-term.

3.7.4.3 WOODY DRAWS

No management activities are proposed for woody draws in this alternative. However, in areas of fuels reduction where there is an abundance of small dead trees, those trees would be felled to restrict livestock and ungulate use of those portions of woody draws. This would improve the recovery time and condition of some woody draw acres. This would allow the woody species to grow, reproduce, and establish.

3.7.5 ENVIRONMENTAL EFFECTS- ALTERNATIVE 3

3.7.5.1 RANGE

The effects of Alternative 3 are almost identical to Alternative 2. There may be some short-term restriction in access but the effects of the fuel reduction treatments would increase range forage and result in a long-term improvement for the grazing resource.

3.7.5.2 NOXIOUS WEEDS

No commercial logging acres or temporary road miles/acres would be used in this alternative, only noncommercial salvage treatments and tree planting would occur. However the acres treated for fuels remains the same and the potential for the spread of noxious weeds is similar to Alternative 2 except the temporary roads would not be used. If the Black Hills National Forest noxious weed monitoring figure of a 3% potential increase is used for this project area,

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[10] Source: Black Hills Forest Plan EIS, Dec. 1996, pg III-192.

[11] Alternative 2: Based on 10, 890 acres of fuel treatments + 345 acres of road impacts = 11,235 acres/.3.0% = approx. 340 acres of potential noxious weed spread.

which would result in an estimated 335 acres[12] of potential new noxious weed infestation in the short-term.

Integrated Pest Management procedures and project design features should manage to control the increase in noxious weeds in the long-term, however an increase in noxious weed infestation may occur in the short-term. Long-term impacts would depend on how effective inventory and control measures are for noxious weeds on the Custer NF and in Carter County.

3.7.5.3 WOODY DRAWS

The effects of Alternative 3 are the same as Alternative 2. Felling small trees on the edges of woody draws (where trees are available) would improve the recovery time for woody draws.

3.7.6 SUMMARY

Table III-34 below summarizes the effects of the Alternatives on the range resource, noxious weeds, and woody draws:

Table III-34: Summary of effect of alternatives on Range, Noxious Weeds, and Woody Draws

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
Range Resource	No effect short-term, Long-term loss of transitory range due to falling trees.	Beneficial long-term on 10,890 acres	Beneficial long-term on 10,890 acres
Noxious Weeds	Current infestation is estimated at 30 acres	Short-term increase of 340 acres	Short-term increase of 335 acres
Woody Draws	No Impacts, natural recovery	Improved recovery	Improved recovery

3.7.7 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the range resource from past, ongoing, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

[12] Alternative 3: Based on 10, 890 acres of fuel treatments + 268 acres of road impacts = 11, 148 acres/ 3.0% = approx. 335 acres of potential noxious weed spread.

3.7.7.1 DISCUSSION

Range and Livestock

The project will treat forested stands by fuels reduction, increasing transitory range and acres for livestock on approximately 10,890 acres. Short-term access restriction would affect livestock in treatment areas. The Brewer Fire improved livestock transitory range on approximately 45,000 acres, and past and current fuels reduction projects have improved range conditions on approximately 8,000 acres. The Kraft Springs Fire will have long-term beneficial impacts on grazing forage on approximately 45,000 acres.

The cumulative effects of past and current activities combined with the proposed action and identified project alternatives will result in an increase the transitory range availability and livestock distribution on most of the Long Pines Land Unit (approximately 60,000 acres).

Noxious Weeds

Noxious weeds are expected to increase due to the project activities, and combined with the cumulative effects of past activities, including the Kraft Springs Fire, Kraft Springs BAER activities, and other ongoing activities, the noxious weed resource would likely result in increased acres of noxious weeds, and could introduce new species of noxious weeds to the area. Inventory and control measures implemented under the normal District guidelines would identify noxious weed infestations in 2003-2004 should control any increase in acres or introduction of new species in the long-term.

Woody Draws

Some woody draws may have been adversely affected by high intensity fire during the 1988 Brewer fire, and the 2002 Kraft Springs fire. However, the cumulative effects of this project when combined with past and other ongoing projects should result in an overall improvement in the woody draw resource in the Long Pines Land Unit. Wildfires and prescribed fires can improve woody draw conditions if fire intensity is low to moderate. This type of fire regime removes conifer encroachment and rejuvenates the deciduous shrub component. Livestock grazing has the most potential to affect the recovery of woody draws. In a worst case situation grazing could be delayed under first frost for 2 years. This would improve the conditions for woody draws in the project area.

3.8 HERITAGE RESOURCE

3.8.1 INTRODUCTION

Heritage resource is a broad term, which refers to cultural properties and traditional life way values. A heritage property may be the physical remains of archaeological, historical, and architectural sites and/or a place of traditional cultural use. Traditional life way value refers to the connection between the landscape and a groups' traditional beliefs, religion, or cultural practice.

The National Historic Preservation Act (NHPA) and its implementing regulations require the Federal agencies to consider the effects of their undertakings on historic properties. The term historic properties refer to cultural properties that have been determined eligible for the National Register of Historic Places (NRHP). The 36 CFR 800 outlines the set of procedures established by the NHPA that Federal Agencies must follow before implementing an action that may affect historic properties

3.8.2 FOREST PLAN DIRECTION/OTHER DIRECTION

Federal Agencies make decisions that may limit use of lands over which it has stewardship. The effect these decisions may have on American Indian traditional use, belief system, religious practices, and life way values must be considered as directed by the Archaeological Resources Protection Act of 1979 (ARPA), the NHPA, the Native American Graves Protection and Repatriation Act (NAGPRA) and the American Religious Freedom ACT (AIRFA). National Park Service Bulletin 38 provides guidance on considering traditional cultural properties. A site demonstrates traditional cultural value if its significance to Native American beliefs, values, and customs has been ethnographically documented and if the site boundary can be clearly defined. If the site meets these criteria they must be considered under the NHPA. Natural features significant in mythology, cosmology, and history of a Native American group are also potentially eligible to the NRHP.

3.8.3 AFFECTED ENVIRONMENT

Over the last 100 years, land use practices such as ranching, farming, logging, grazing, recreation, road systems, and policies of fire suppression have changed or altered heritage resources in the Project Area. These changes have contributed to the development of the historical landscape as seen and experienced today.

The Project Area is within Long Pines Land Unit of the Sioux District located in extreme southeastern Montana. The unit is within the Pine Parklands and has been described as an "island-like" parcel of National Forest land surrounded by private-owned acreage (*Beckes and Keyser 1983:210-211*). This is a pattern created by landform, since the Forest units are tree covered buttes and hills that were set aside in public ownership prior to 1910, while the surrounding, more accessible prairie lands were homesteaded for farms and ranches.

This intricate environmental mosaic has proven attractive to past and present populations. Culturally, the Pine Parklands appear to be the dividing line between the northern and southern Northwestern Plains with its own unique subsistence strategies based on the Pine Parkland environment (*Fredlund 1981:115-117*). These heritage resources suggest that the Ponderosa Park Pinelands have been occupied for at least 10,000 years. Studies of recorded sites suggest a basic pattern of exploitation involving small groups traveling through the area on seasonal round utilizing the floral and faunal resources during the PaleoIndian, Archaic, Protohistoric, and Historic periods to the present day.

3.8.3.1 CULTURE HISTORY

The Long Pines Land Unit on the Sioux District is one of eight distinct land units that are referred to as "islands in the Plains", and consist of sandstone and limestone ridges and buttes of Tertiary age. These island-like oases are localized areas of timbered buttes and ridges surrounded by harsh, arid, open plains. These areas offered the region's best available water, shelter, and wild game for prehistoric and historic peoples. The relatively high prehistoric and historic occupation of these areas resulted from the resource diversity present. Detailed overviews covering the prehistoric and protohistoric use of the region may be found in *Frison (1978)* and *Beckes and Keyser (1983).*

Archaeological evidence suggests that the Long Pines unit has been used and occupied from the Middle Prehistoric Period (8500 years ago) to present. The existence of the Mill Iron site just 35 miles east and north of the Long Pines further suggest the area may have been utilized even earlier by Paleoindian people approximately 11,200 years ago, during a period between Clovis and Folsom.

Site types include prehistoric artifact scatters, historic homesteads, sawmills, stone circles, Civilian Conservation Corps (CCC) camps, CCC built roads, CCC built campgrounds, rock cairns, sheepherders monuments, historic and prehistoric rock art sites, sites containing both historic and prehistoric remains, and prehistoric rock quarries. These site types represent the remains of past activities in the Long Pines and compose the cultural landscape we experience today.

Of particular interest is the existence and activities of the CCC in the Long Pines. This program was developed during the Great Depression through a variety of New Deal era Federal projects that matched unemployed youth with conservation and drought projects. One CCC camp, Camp DF-40, was established within the Long Pines just north and west of the District Office in 1934 and operated intermittently until June of 1938. During this time, the CCC built Speelmon, Plum Creek, Snow Creek, Capital Rock, and Exie Roads as well as the Wickham and Lantis Springs campgrounds. They also built Tri Point Lookout and numerous reservoir and spring developments while "supplying 75,000 fence posts, 3,000 telephone poles, 2.5 million board feet of saw timber" (Richmond 1978:344). Many of these projects are still in use today.

The Lakota, Cheyenne, Crow, Hidatsa, Arikara, and Mandan are known to have used the Long Pines unit in the past, and today may use the area for traditional cultural practices such as fasting and plant collection. Many of these sites are considered by Native Americans to be sensitive locations that demand respectful treatment and protection.

3.8.4 FIELD SURVEYS/RESOURCE CONTACTS

At least eighty heritage resource investigations, covering approximately 12,300 acres, have been conducted within the Long Pines Unit from 1970-2001. This is about 19% of the entire Project Area. Most of the early inventories were conducted for range improvements and timber sales while recent surveys have been conducted in the advance of prescribed fire. One of the most intensive inventories was the post Brewer fire survey for a salvage sale that included the original Ward Sale boundaries (which burned before it could be harvested). What made this an important inventory was that prior to 1988, only 20 heritage sites were found in the Long Pines during numerous timber sale surveys totaling over 5,800 acres. The impression left to the archaeologists was that few sites would be found in the timbered stands of the Long Pines. With the ground cover and duff removed by the fire, surface visibility was enhanced and previously surveyed areas revealed hidden archaeological remains within the ponderosa pine stands. Thirty-three new sites in 5,365 acres were recorded *(Larsen et al. 1989)*. The survey suggested a site density of one site every 163 acres, surpassing the previous site density estimates of one site per 292 acres. The post-Brewer fire inventories also contributed important information on the effects of wildfire on the heritage record.

By 2001, 132 sites had been recorded in the Project Area. Three prehistoric sites revealed artifacts that provide time-markers for occupation. Sites 24CT412 and 24CT556 may be associated with the Middle Archaic period McKean Complex. Site 24CT275 was test excavated in 1984 and projectile point base possibly related to the Late Archaic was recovered.

Surveys for the previous North Long Pines project (project area was burned in by the Kraft Springs Fire before implementation), proposed vegetative management activities included timber harvest, prescribed burning, and road building and/or obliteration. All units identified for ground disturbing activities such as commercial and noncommercial thinning were inventoried at a 100% level. In addition, all existing roads that were to be used or modified in some fashion were inventoried. A total of 5,430 acres was inventoried and 15 new sites were recorded (*Walker-Kuntz etal 2002; Guilfoyle etal. 2001*). Over 20 miles of road were inventoried resulting in the recordation of eleven new sites.

In May of 2002 students from MSU-Billings technical college attended a field course in the ecology and archaeology of the Long Pines. The students, instructed by Tim Urbaniak, recorded four new rock art sites in the Long Pines and recreated digital photo points for comparison with early range condition photographs. Table III-35 summarizes the 162 sites recorded prior to the Kraft wildfire and their site types.

Table III-35: Recorded Heritage Sites Prior to the Kraft Springs Fire

SITE TYPE	DESCRIPTION	TOTAL	PERCENT
Artifact scatters	Prehistoric camps	63	39%
CCC associated sites	Tri Point Snow Creek road, old Exie road, Speelmon Creek road, Plum Creek road, Capital Rock road Lantis and Wickham Campgrounds Reservoirs (6) Pole treatment area Spike camps	18	11%
Rock Cairns		11	7%
Prehistoric Rock Features	Stone arcs Stone alignments	6	4%
Stone Rings	Stone circles Teepee rings	16	10%
Rock Art	Prehistoric	6	4%
Prehistoric Quarry		4	2%
Historic	Carter Well Homestead (14) Saw mill (5) Depression/ root cellar (4) Rock Art - initials/brands (3) Pioneer Cemetery Sheepherder Cairns (3)	31	19%
Historic and Prehistoric Sites	Artifact scatter and historic initials Historic and prehistoric artifact scatter Artifact scatter and Historic mine claim Stone ring and historic artifacts	7	4%
GRAND TOTAL		162	

3.8.4.1 KRAFT FIRE SUPPRESSION, BAER, AND RESTORATION INVENTORY

Heritage resources were identified as a concern during the Kraft wildfire situation analysis, and the emergency procedures identified in the regional programmatic Agreement (PA) with the Montana State Historic Preservation Officer and the South Dakota State Historic Preservation Officer was enacted. Over 90 sites were identified within the fire perimeter that could be affected by wildfire and suppression activities, and this information was relayed to the incident commander. None of these sites were affected by suppression activities. As soon as it was safe and practical, all ground suppression activities including dozer and grader lines and safe zones were inventoried. Seven new heritage sites were recorded.

For the BAER effort, the Sioux District and Custer Forest heritage maps and database were reviewed to identify important heritage resource sites within the burn perimeter. One hundred and ten sites meeting the criteria of potentially eligible or listed NRHP sites and location within the burn perimeter were identified. Further review of the list was conducted to identify those sites that would be most susceptible to erosion, watershed failure or debris flow, based on attributes such as topographic position and site type. Sites previously burned over by the Brewer Fire were also considered since the fire severity effects to those sites were compounded by downed timber from the previous fire. In all, 36 sites were identified for field assessment for the BAER effort.

Only six sites, 24CT10, 24CT499, and the Capital Rock, Speelmon Creek, Snow Creek, Plum Creek roads, and the Lantis Springs and Wickham Campgrounds, were field assessed due to safety hazards, uncontained fire, and BAER time frames. Emergency protective treatments were identified for the four CCC roads that recommend cleaning out the CCC culverts and installing new culverts alongside the CCC culverts where necessary. By incorporating and maintaining these CCC-related structures within the emergency BAER road reconstruction the Forest Service will protect these resources for another 50 years.

Sites 24CT10 and 24CT499 are prehistoric sites and recommendations for both sites included the removal of hazard trees from within the site perimeter so that potential fuel loading would be reduced. Seeding was also included for 24CT499.

The remaining 30 sites will be field assessed during the implementation phase of the BAER effort, and, where necessary, treatment plans will be developed and implemented. Prior to implementation, all protective measures and treatments will be reviewed by the MTSHPO and the SDSHPO.

As a result of the Kraft Fire, the Long Pines restoration effort was reconfigured to include treatment areas within the Kraft Fire boundaries. An additional 4,200 acres were identified as potential commercial salvage units. Forest Service archaeologists inventoried these new units in the fall of 2002 and 64 new sites were recorded. Of particular note was the discovery of a cluster of stone circle and cairn sites concentrated within an area of approximately 600 acres located on a divide between Plum Creek and Slick Creek. This unusual concentration contains over 20 sites and may represent a special function, season of use, a specific time period, and/or cultural affiliation. Dense, burned ponderosa pine growing within and bordering these site features threaten the integrity of many of these sites should the trees uproot or break off. With a site density of one site every 69 acres, this new data further substantiates the need for post fire inventories that identify the sites at risk and the development of site stabilization measures.

Two new site types were identified in the project area – rock shelters with evidence of prehistoric occupation and petroglyphs. In addition, the McClary ranger station and the CCC Camp F-19 were recorded.

In all, there are now 236 sites recorded within the Long Pines unit, of which 182 sites are located within the Kraft Fire perimeter (within the Forest Service boundary). Table III-36 summarizes the sites by type and number that occur within the Long Pines unit. New site types are in italics.

Table III-36: Current Heritage Sites in the Long Pines Land Unit

SITE TYPE	DESCRIPTION	NEW SITES	TOTAL SITES	PERCENT
Artifact scatters	Prehistoric camps	9	72	31%
CCC associated sites	Tri Point Snow Creek road,Old Exie road, Speelmon Creek Road, Plum Creek Road, Capital Rock Road Lantis and Wickham Campgrounds CCC reservoirs (7) Pole treatment area Spike camps *CCC rock art inscriptions (2)* *CCC Camp F-19*	4	22	9%
Rock Cairns		15	26	11%
Prehistoric Rock Features	Stone arcs Stone alignments *Oval Structure*	3	9	4%
Stone Rings	Stone circles Teepee rings	30	46	19%
Rock Art	Prehistoric	1	7	3%
Prehistoric Quarry			4	2%
Rock Shelters	*Prehistoric use with rock art*	2	2	1%
Historic	Carter Well Homestead (14) Saw mill (5) Depression/ root cellar (4) Rock Art - initials/brands (3) Pioneer Cemetery Sheepherder Cairns (3) *McClary Ranger Station* *Abandoned road* *Survey Marker*	9	40	17%
Historic and Prehistoric Sites	Artifact scatter and historic initials Historic and prehistoric artifact scatter Artifact scatter and Historic mine claim Stone ring and historic artifacts *Historic Foundation and prehistoric artifact scatter*	1	8	3%
GRAND TOTAL		74	236	

3.8.5 ENVIRONMENTAL EFFECTS

Fire has always been a factor to contend with in the project area. Numerous fires burned both the grasslands and timber in the Long Pines in 1886, 1902, 1908, 1913, the Brewer Fire in 1988, and most recently the Kraft Springs fire 2002. The Brewer fire consumed 58,000 acres and burned over at least 64 (35%) of recorded sites within the Kraft fire perimeter. The site monitors in years 2000 and 2001 of nine sites burned in the Brewer fire revealed that the smudging and charring noted on the artifacts in 1988 had vanished and heavy grass cover obscured the prehistoric sites. Of concern, however, was the potentially high fuel loads at four sites from snags, fallen burnt timber, and deadfall should the area be burned again. All four sites were burned again during the Kraft Springs fire and were subjected to high fire severity, which has denuded the site surface and caused severe soil erosion. These sites have been identified for BAER stabilization treatments.

While archaeological sites on the Sioux District were no doubt burned over numerous times in the past, it was not with the burn intensity of today's' fires caused by a combination of heavy fuels loads and extreme drought conditions. Effects of fire on archaeological sites are often broken down into short-term effects and long-term effects. Short-term effects are defined as those that occur during and shortly after a fire and include the physical effects of fire on cultural materials, effects of fire suppression, and effects of forest rehabilitation (e.g. slope stabilization, seeding/revegetation, timber salvage).

The nature and extent of fire damage to cultural resources depends on fire intensity, duration of heat, and heat penetration into the soil. These conditions are directly related to the density and size of fuels on and adjacent to a site, as well as the site type. Sites containing wooden features, bone, plant remains, and other organic, combustible materials can be consumed partially or entirely by fire. Cracking, spalling, and discoloration can also occur to lithic materials with obsidian particularly susceptible to alteration. Rock faces containing inscriptions and/ or prehistoric petroglyphs can be scorched and spalled.

While many variables including, wind, humidity, and topography also influence fire intensity, fuel load is thought to be the most important determinant (Lissoway and Proper 1990: 27). The Phase 1 archaeological research conducted by Lent etal, 1992 suggests that fire effects are present on artifacts under all fire intensities, but fuel loading is the critical variable in the severity of these effects. Where there are no fuels burning in place, fire effects may be confined to the surface. Where there is increased resident time because of a log or other types of fuel loads, subsurface artifacts can be severely affected to a depth of 20cm. These preliminary findings suggest that impact to heritage resources can be held to a minimum by removing extraneous fuel loads from the surface of the site through hand removal of downed fuels, and fuels reduction via hand or mechanical means.

Long-term effects include erosion and falling trees. Erosion often occurs in the aftermath of fires due to the destruction of vegetation cover and loss of organic material in the soil. Severely burned areas may fail to revegetate quickly and, depending on the severity of the burn, may contain hydrophobic soils that greatly reduce water infiltration. Increased rates and frequency of discharge (i.e. runoff) may result in substantially higher rates of erosion that may last for years following a fire. Soil movement may increase following a fire with shallowly buried sites possibly being exposed and destroyed or sites being buried or deposited down slope.

Accelerated tree fall from trees killed or damaged by fire, and eventual uprooting of fire-killed trees can damage site features, expose buried components, and displace artifacts. Not only does increase soil turbation, it may create basin-type features which can serve trap charcoal and soil, leading future archaeologists to identify these anomalies as fire hearths, or stone features. Dead and dying trees can be expected to fall or wind throw anywhere from two to ten years after the fire. As seen in the Brewer fire, this effect also contributes to increased fuel loading on sites, making them even more vulnerable to severe burning with the next wild fire episode. Observations from the 1988 Brewer fire, the 2000 Stag fire in the ponderosa pinelands of Ashland, and the recent Kraft fire suggests that the control and reduction of fuel loads may ultimately be most beneficial for the preservation of the heritage resources.

Wildfire can also present management with follow-up resource protection problems due to the effects of exposing previously unknown or inaccessible sites and materials to theft or vandalism. Wildfires expose sites previously difficult to locate due to heavy ground and duff cover and dozers and road blading may create access into previously inaccessible areas.

3.8.5.1 EFFECTS COMMON TO ALL ALTERNATIVES

Prehistoric and historic heritage resources are a nonrenewable resource. Heritage resources have many values including their use to gather scientific information on human culture history, interpretive and educational value, values associated with important people and events of importance in our history, and often an aesthetic value as in a prehistoric petroglyph or an historic landscape. For the American tribes, and other traditional culture group's archaeological and historic sites often have importance for religious and ceremonial purposes or simply as locations for traditional uses important in a particular group's ongoing cultural identity.

An effect, according to 36 CFR 800.9(a), may include an alteration to the property's characteristics of location, setting, or use. Adverse effects are defined as those which may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association and include but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property
- Alteration of the character of the setting when that character contributes to the property's qualification for the National Register,
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

A direct effect occurs when the action of the undertaking itself impacts the heritage resource. For example, ground-disturbing activities such as road construction or timber harvest may damage or demolish a site. An indirect effect is not caused by the action itself but is the secondary result of the undertaking. An example would be manipulation of a watershed which could in turn cause increased erosion of heritage sites downstream or the upgrade of existing roads or trails which improves or allows public access into previously secluded site areas. Increased access can be directly related to an increase of vandalism or artifact collection.

Based on the immediate and delayed fuel reduction activities designed to meet the project's objectives, three treatment types are proposed for Alternatives 2 and 3. The treatment types and their potential effects to the heritage resources are described below.

1. Fuels reduction using commercial salvage. Ground based tractor yarding would be used to harvest commercial sized trees affected by moderate to high intensity wildfire. Logging residue and non-commercial size trees would be treated to reduce activity fuels. Fuel treatments may include machine piling and burning, whole tree yarding, prescribed fire, or any combination of these treatments. This treatment would incur the most ground disturbance and has the highest potential to damage heritage sites. All but 183 acres of areas considered for this treatment type has been inventoried at a 100% level for heritage resources.

2. Fuel reduction using non-commercial treatments: Non-commercial fuel treatment would involve the removal of dead and severely damaged trees to reduce future fire hazard, through a combination of machine piling, whole tree yarding, and prescribed fire. Like the commercial salvage, this treatment involves ground disturbance and has the potential to damage heritage sites. All but 807 acres of areas considered for this treatment type were inventoried at a 100% level for heritage resources. The remaining acres would be inventoried prior to treatment.

3. Tree planting. Areas where natural regeneration of the ponderosa pine is not expected to occur due to lack of adequate seed source would be planted with tree seedlings. While restoration of the pine parkland environment would be beneficial to the heritage resources, tree planting within site boundary may have an effect on the site depending on site type. Only 645 acres of proposed tree planting have been inventoried for heritage resources but will be inventoried prior to treatment.

Each alternative was evaluated in reference to the effects of the various proposed treatment activities on all 182-recorded sites located within the Kraft Fire perimeter in the project area. These sites are located within treatment areas described above and are also in the most need for preservation and protection from short and long term effects from the Kraft fire. For the purpose of this document all recorded sites that were not previously formally evaluated as Not Eligible for nomination to the National Register of Historic Places (NRHP) are considered and treated as eligible for listing on the NRHP. Additional heritage resource investigations for areas not inventoried but identified for treatments such as commercial salvage, non-commercial fuel treatment, tree planting, or road maintenance and temporary roads will be accomplished in advance of the proposed Federal undertaking as directed by the PA, Federal Law and Forest Service policy.

Four roads, Snow Creek, Capital Rock, Plum Creek, and Speelmon Creek, were built by the CCC and are considered eligible for nomination to the NRHP. Any changes, reconstruction, or maintenance of these roads outside of the established CCC roadbed will require formal consultation with the SHPO.

At least forty-four sites within the Project Area have been identified as potential culturally sensitive properties due to their possible association "with traditional Indian ceremonies, cultural practices and important events in tribal history" (*Deaver and Kooistra-Manning 1995: 2.1, 3.13*). Twenty-six sites are rock cairns, a site type identified by Deaver and Manning as possible grave markers, places of offering and/or trail markers. Nine sites that contain prehistoric rock art occur within the project area. Rock art sites are considered "sacred by some groups who believe that the images were created by supernaturals or depict events with supernatural significance"(*Deaver and Manning 1995:3.15*). Nine sites are stone structures that may be associated with fasting rituals. Consultation with the Native American community and/or tribal cultural committees, concerning these specific sites, has not occurred; therefore their actual affiliation and importance has not been verified. Should any of these sites be threatened by project activities consultation with the Crow, Northern Cheyenne and Lakota, at a minimum, would be required to assure their respectful consideration and treatment.

The table below summarizes the effects on heritage resources by alternative and proposed treatment type.

Table III-37: Summary of Effects on Heritage Resources

Treatment Type	1	2a[1]	2b	3	No Treatment	Existing Roads
Alternative 1					182	
Alternative 2	82	11	5	1	84	24
Alternative 3		56	39	3	84	

[1] 2a are non-commercial fuel treatment sites; 2b are delayed non-commercial fuel treatment sites.

3.8.5.2 ALTERNATIVE 1: NO ACTION

Under this alternative no broad scale activities that would move the Kraft Salvage project area toward the restoration of a properly functioning Pine Parkland ecosystem would occur and the 182 sites located within the Kraft fire perimeter would be left untreated. These sites, as well as an unknown number of unrecorded sites, would be subjected to tree uprooting, increased fuel loads, and soil erosion.

Without some sort of measure to restore Pine Parkland functions to a more natural range of variation, the probability of another catastrophic fire is likely in the Project area. Fuel loads on site would increase as the dead and dying trees uproot and fall, causing the loss of important archaeological information. Should these sites be burned over again during a wildfire the chance that they would be adversely affected is great both from the high fire intensity, fire severity, and accompanying fire suppression efforts. Vandalism and illegal site collection may increase with the new exposures of sites through erosion and lack of vegetative cover, and improved access via dozer lines.

3.8.5.3 ALTERNATIVE 2: PROPOSED ACTION

For this undertaking, a proactive heritage site management approach would be undertaken in an effort to reduce fuel loads on the sites most susceptible to effects from moderate to high fire intensity (physical damage from downed timber and uprooted trees) and high fire severity (sites that have been denuded of vegetation and at risk for severe site erosion, and sites where fuel loads have increased due to downed timber). This approach calls for the inclusion of the heritage sites in the proposed activity areas rather than avoiding the site by modifying the salvage and/or fuel treatment boundary to exclude the site. All sites would be avoided by ground disturbing harvest and fuel treatment activities, but where feasible, dead and dying trees that may damage the sites or contribute to increased fuels would be removed. This site treatment will be individually designed for each site located within treatment boundaries and prior to harvest and/or fuel treatment activities. It will only be conducted in conditions where no ground disturbance would occur, and under the direct supervision of a Forest Archaeologist. It also calls for site "pretreatment" prior to prescribed burning where sites that have downed timber and potentially higher fuel loads would be cleared of these fuel loads prior to ignition.

Under this alternative, 82 sites may be affected by commercial salvage, eleven sites may be affected by non-commercial fuels treatment, five sites may be affected by non-commercial delayed fuels treatment and one site may be affected by tree planting. Given the approach described above, a total of 98 (54%) of all sites located within the Kraft Fire boundary would be "treated" to reduce the amount of downed timber, tree uprooting, and potentially higher fuel loads. While this approach will not remove the prospect of another damaging wild fire in the project area, it should make the heritage sites more "fire resistant" allowing for a faster moving, cooler fire and contribute to long-term site preservation. Since the approach is individually prescribed and does not allow any ground disturbance within the site boundaries, the no direct effects to the 98 sites is anticipated. The five-year postponement for the delayed non-commercial fuel treatments may compromise site integrity for 5 sites located within these units as tree uprooting and tree fall would be ongoing and could damage these sites.

The one site is located within the proposed tree planting areas. While this treatment type may protect the sites from further soil erosion and revegetate denuded sites more rapidly, sites within the units may be damaged by the actual implementation of the treatment. Even though these treatments can be redesigned to exclude the sites, increased fuel loads in the units located outside of the commercial harvest and non-commercial fuel treatment areas could still compromise site integrity.

System road maintenance of 82 miles of roads to be used for timber hauling may affect at least 24 sites. Not all of these roads have been inventoried for heritage resources. Five of known sites have been mitigated during previous reconstruction. Should road maintenance be needed within site boundaries, the effects of this activity would require site evaluation and possibly mitigation. In addition, 67 miles of road is proposed for road reconstruction and restoration activities under the National Fire Plan. Approximately half of these roads have been inventoried for heritage resources and four of the six collector roads are considered eligible for nomination to the NRHP and may require mitigation if modified.

Constructions of around twenty miles of temporary roads are proposed under this alternative. These roads would require inventory and possibly site evaluation prior to construction. Since these are not system o permanent roads, realignment around sites and/or dropping some of the temporary roads could be considered as protective measures to reduce site impacts. With the proposed system road maintenance, NFP road restoration, and temporary road construction, access to currently secluded heritage sites would be improved, exposing them to artifact collection and damage from vandals.

The cumulative effect of this alternative would be the restoration of portions of the project area to a more desired condition and, eventually, a pre-fire suppression historic landscape. Through the mitigation of indirect effects and the proposed site treatments, this alternative may preserve and protect half of the recorded heritage resources within the Kraft Fire perimeter, and includes the heritage resources as an integral part of the cultural landscape.

3.8.5.4 ALTERNATIVE 3

Effects for alternative 3 are similar to Alternative 2 with the exception that the potential for ground disturbance activities is less since no temporary roads would be built, no system roads would be maintained, and no commercial salvage activities are proposed. Fifty-six sites are located within the non-commercial fuel treatment areas, 39 sites are located within the non-commercial delayed fuel treatment areas, and three sites are located within proposed tree planting areas located outside of the non-commercial fuel treatment areas. Without immediate site treatment in areas proposed for delayed non-commercial treatments, however, the integrity 39 sites would be at risk of damage from tree falling and uprooting. A total of 95 sites would be "treated" following the approach described under Alternative 2, constituting 52% of all recorded sites located within the Kraft fire perimeter.

3.8.6 CUMULATIVE EFFECTS

The cumulative effects of alternative 2 and 3 would be the restoration of portions of the project area to a more desired Pine Parkland ecosystem where a regime of more frequent, low intensity wildfire occurs and, eventually, a pre-fire suppression historic landscape. Through the mitigation of indirect effects and the proposed site treatments, these alternatives may preserve and protect half of the recorded heritage resources within the Kraft Fire perimeter, and includes the heritage resources as an integral part of the Pine Parkland landscape. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.9 VISUALS RESOURCE

3.9.1 AFFECTED ENVIRONMENT

The dominant landscape component in the Long Pines Land Unit is ponderosa pine forest woodlands over gently rolling terrain intermixed with prairie grassland. The area contains scattered diverse features including distinctive rock outcrops, creeks, and meadows. There are private land holdings containing rustic residential structures (See photos below).

The following tables describe the visual/scenic characteristics, attributes, and objectives for the project area.

Table III-38: Landscape Character Attributes

Landscape Character - Hills and mesas of ponderosa pine rise above rolling grasslands; they are interspersed with meadows and interesting rock bluffs /outcrops in the steeper terrain.		
Existing Condition VQO Basic Retention is being met in the steep slopes with rock outcrops and in the grassland meadow forest mosaic and edges. Both *partial retention* and *modification* are met intermittently throughout the project area although in the older, overgrown forest and burned areas *rehabilitation* applies	Existing Scenic Integrity High in the landscape consisting of mosaic vegetation and rock outcrops. Moderate in the forest areas of older and overgrown ponderosa forest. Low in the overgrown forest. Low to very low in the burned areas.	Recommended Scenic Integrity Objectives High throughout the landscape mosaic of meadows and ponderosa forest, moderate in the previously burned areas

Table III-39: Scenic Integrity Objectives

Views from Forest Road 3117 and private home sites	High Scenic Integrity Objective (SIO)	Deviations from the valued landscape character may be present but so completely repeat the form, line, color, texture, and pattern common to the landscape character that they are not evident.
Remainder of project area, Long Pines Unit	Moderate Scenic Integrity Objective (SIO)	Landscape may appear slightly altered but deviations must remain subordinate to the character. The modification should appear as a natural occurrence when viewed in foreground or middle ground distances.

The "islands of green in a sea of rolling prairie" are valued for the visual diversity they bring to the environment. Visitors, hunters, and summer home residents enjoy the forest green, remote character, and dramatic rock formations including the nearby National Natural Landmark, Capital Rock (See Figure III-12). Within this context, the project area is primarily ponderosa pine forest.

Figure III-12: Capital Rock National Natural Landmark

In 1997, visual resources were assessed to the level of developing concern Scenic Classes for the Long Pines unit. Scenic attractiveness maps were made from stand type maps and concern level maps were made using distances from the main travel route, NFSR 3117. These two maps were combined to produce the Scenic Class maps. Existing integrity and scenic integrity objectives have not been developed for the area.

3.9.1.1 KRAFT SPRINGS FIRE - CHANGED CONDITION FOR VISUALS

The 2002 Kraft Spring Fire has affected the visual quality of the area substantially. Large areas of green-forested landscapes have been affected by stand-replacing fire and a blackened forest condition is present in many areas (See Figure III-13).

Existing scenic integrity levels for the foreground, middleground and background view areas have been substantially altered by the fire. In addition, many areas may be undesirable for camping, hiking, and other recreational activities that need a green-forested landscape to attract recreational users.

Figure III-13: Photo showing visual quality impacts of the Kraft Spring Fire. Mosaic of high, moderate and low burn areas.

3.9.2 ENVIRONMENTAL EFFECTS

3.9.2.1 NO ACTION ALTERNATIVE

The existing visual character of green and blackened ponderosa pine forest intermingled with burned and unburned grassland meadows and rocky ridges are visible from the primary travel corridor (Forest Road 3117) and private land that includes six (6) home sites. Alternative 1 will not reduce the long-term hazardous fuel conditions that would occur as thousands of fire-killed trees fall to the ground in 1-2 decades. The risk of another large wildfire could affect the remaining green forested stands in the Long Pines Land Unit has the potential to detrimentally affect scenic attractiveness as trends toward negative conditions in the area. The scale of the change and unacceptable visual change would depend on the extent of the disturbance.

3.9.2.2 PROPOSED ACTION – ALTERNATIVE 2

Fuel reduction treatments, tree planting, and road management activities would change the visual impacts the scenery as seen from the sensitive locations of the main road and the private home area. The element of landscape texture is affected by salvage prescriptions that remove large fire-killed trees. Texture would be the major change in existing visual environment because of the homogeneous nature of the existing forest (especially in the middle ground) given the proposal to salvage large fire-killed trees. The views from the private home properties northeast into the forest would be the most sensitive to these changes, however part of the existing scenery in that view contains exposed rock and soil and a variety of texture in those locations. The scenery without treatments would result in a gradual deterioration of the scenery as trees fall down and those that remain would take on the appearance of patches of white snag trees as the blackened bark falls off the dead trees. However, some stands were affected by very intense fire that left the bark burned away and those trees will maintain a blackened appearance until falling.

The removal of patches of fire-killed trees would encourage the mosaic appearance expected in this landscape character and help enhance the visual diversity. Short-term visual effects would include slash remaining from salvage harvest. Other short-term visual effects would be the appearance of harvest equipment in the treatment units and scaring from skidding or roads, which would dissipate over time.

The blackened treatment areas would be evident until the stand is reforested. Areas that have planting would recover the forested visual objectives sooner than those areas that would have natural regeneration.

3.9.2.3 ALTERNATIVE #3

Visual resource effects in alternative 3 are different than in Alternative 2, due to the lack of salvage harvest of large fire-killed trees. This would result in a more natural post-fire visual condition with large fire-killed trees in the viewing area, but would contribute to the long-term hazardous fuel when those trees fall to the ground in 1-2 decades.

3.9.3 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the visual resource from past, present, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.9.3.1 DISCUSSION

The existing disturbance regime following the 1988 stand-replacing wildland fire (Brewer Fire) and the 2002 Kraft Springs Wildfire in the Long Pine landscape has substantially affected the visual quality. Other potential future activities would include road decommissioning and other post-fire rehabilitation activities. The future decommissioning of roads would be analyzed under a separate NEPA document. All of those activities would continue to affect the visual quality of the area; however, the least beneficial cumulative effect is the potential for further catastrophic fire in remaining unburned forested stands if no action is taken.

3.10 RECREATION

3.10.1 INTRODUCTION

This section will include the existing condition of the recreation resource, and effects of the proposed project and alternatives on the recreation resource. This section will also address any cumulative effects implementation of the project may have on the recreation resource in the area.

3.10.2 AFFECTED ENVIRONMENT

The Sioux Ranger District contains features that attract vacationers that are looking for solitude versus other types of attractions. The landscapes found are not ones that most people travel to see as they might mountains with summer snow caps, vast areas of lush forested areas surrounding fresh mountain streams or fresh water lakes. The plains of Carter County offer seemingly endless horizons of open prairie. The open grasslands have a scattered array of hills that seem out of place. The hills can be seen for miles and are dotted with pine trees. These hilly formations appear as islands in the grass, they are indeed Prairie Isles.

The majority of the prairie isles are the National Forest System lands and are the sources for spring water, shade, winter cover, habitat for wildlife, and they provide solitude. Although visible for many miles and reasonably accessible, the prairie isles are off the main routes and visitors would have to make a special effort to visit them.

The setting is described as hilly formations dotted with trees surrounded by endless seas of grass. Water is scarce and developments are few and far between. The area is not heavily populated and appears to be quite remote. Lack of water is a problem for the rancher as well as recreation users. Water from the various springs generally does not meet the Federal minimum standards for potable water. Many of the roads and trails are accessible to four-wheel drive vehicles, but not regular passenger cars. The cliffs are natural barriers making access to some of the tabletops limited. The trees offer visual relief as well as relief from elements, and their aesthetic value is quite high generally due to their scarcity.

3.10.2.1 RECREATION USE

Recreation use is mainly non-development oriented. Lantis Springs Campground and Wickham Gulch Picnic ground are exceptions in that they have roads, parking spurs, and toilets. Lantis Springs campground has seven units with picnic tables and fire rings, and Wickham Gulch has four. Flowing springs are an integral part of these campgrounds and are the reason the sites were developed in those locations. The existing improvements in Lantis Springs are in good shape as this campground was reconstructed after the 1988 Brewer wildlife. The existing improvements in Wickham Gulch picnic ground are not in good shape. Most are 1950's vintage and are in need of replacement.

Road access is available to virtually all parts of the Long Pines land unit, however the majority of the roads are useable only by four-wheel drive, high clearance vehicles. Hunters who come to the area in fall are the primary users, both in hunting and camping. Local residents use the area for picnicking, family reunions, weddings, school outings, and other private parties. A major dispersed site is located in the southern portion of the land unit; Capitol Rock National Natural Landmark.

Until 1995, the Forest Service used the Recreation Information Management System (RIM) to measure recreation use. It is being replaced with the National Visitor Use Management System. This district is still in the data collection stage of the new system. Information from RIM is discussed below, as it would likely not change meaningfully.

Information obtained from the 1995 Recreation Information Management System for the Sioux District of the Custer (RIM) report indicates approximately 6,400 Recreation Visitor Days (RVD) for Montana. A RVD is one visitor for 12 hours. These figures may not sound large compared to 522,000 RVD's for the Beartooth Ranger District or over 115,000 RVD's for the Little Missouri National Grasslands to the north, but they are important to the area involved.

To provide use information, all recreation use is divided into two categories: dispersed recreation and developed recreation. Activities in the dispersed category are general day camping, various viewing activities, ice and snow craft travel, all terrain vehicle travel, nature studies and education, biking, hiking and walking, horseback riding, sledding and other snow play, and hunting. Activities in the developed category are automobile travel, camping, and picnicking. Table III-40 and Table III-41 display recreation use on National Forest Lands in Montana between 1990 and 1995.

Table III-40: Recreation Use - Visitor Days – Developed Areas [1]

Activity Grouping	1995	1994	1993	1992	1991	1990
Automobile travel	1.0	1.0	1.0	2.0	3.5	2.0
Camping, Automotive	0.3	0.3	0.3	0.4	0.5	0.4
Camping, Trailer	0.3	0.3	0.3	0.3	0.5	0.3
Camping, Tent	0.3	0.3	0.3	0.2	0.3	0.2
Picnicking	0.5	0.5	0.5	0.6	0.6	0.6
TOTALS (thousands)	2.4	2.4	2.4	3.5	5.4	3.5

[1] A recreation visitor day is a 12-hour visit by one person.

Table III-41: Recreation Use – Visitor Days – Dispersed [(1)]

Activity Grouping	1995	1994	1993	1992	1991	1990
Camping General Day	0.1	0.1	0.1	0.1	0.2	0.
Viewing Scenery	0.1	0.1	0.1	0.3	0.3	0.3
Viewing Activities	0	0	0	0	0.2	0.2
Viewing Works of Humankind	0	0	0	0	0.1	0.1
Ice and Snow Craft Travel	0	0	0	.01	0	0
Specialized Landcraft Travel	0.1	0.1	0.1	0	0	0
Nature Study, Hobby, Education	0.2	0.2	0.2	0.3	0.3	0.3
Hiking and Walking	0.3	0.3	0.3	0.5	0.5	0.5
Horseback Riding	0.2	0.2	0.2	0.4	0.4	0.4
Sledding, Tobogganing	0.1	0.1	0.1	0.1	0	0
Snow Play	0.2	0.2	0.2	0.3	0.4	0.4
Cross country skiing, Snowshoeing	0.1	0.1	0.1	0.1	0	0
Hunting – Big Game	0.8	0.8	0.8	0.8	0.8	0.4
Hunting – Small Game	0.1	0.1	0.1	0.2	0.2	0
Hunting – Upland Birds	0.1	0.1	0.1	0.3	0.3	0.8
Non-Consumptive Fish and Wildlife Use	0.2	0.2	0.2	0.4	0.4	0.4
Other Recreation Activities	0.6	.06	.06	1.1	2.0	2.0
TOTALS (thousands)	3.0	3.0	3.0	5.0	6.1	6.0
GRAND TOTALS (both tables), (in thousands)	6.4	6.4	6.4	8.5	11.5	9.5

[1] A recreation visitor day is a 12-hour visit by one person.

Although this data is dated, recreation use has not changed considerably since 1995. There may be a slight increase in hunting. Hunting accounts for the largest dispersed use. Carter County has been, and continues to be a favorite spot for hunting mule deer and turkey in Montana. Three permitted outfitters provide hunting outfitting and guiding in the Long Pines land unit. One of the three outfitters operates solely within the project area. The second major dispersed use is hiking and walking with horseback riding and nonconsumptive fish and wildlife use third. Automobile travel is the largest developed use with picnicking and camping being second highest use. The trees on the island hills attract local people off the prairie.

3.10.2.2 KRAFT SPRINGS FIRE- CHANGED CONDITION FOR RECREATION

The 2002 Kraft Spring Fire may have affected the recreational use of the area considerably. Both Wickham Gulch and Lantis Springs Campgrounds were burned and some structures damaged or lost. Hazard trees are a major concern at those recreational facilities and along the numerous roads in the project area. Big game hunting access would be the most affected by the Kraft Springs Fire, due to the potential for seasonal road closures to protect big game and provide more security cover for wildlife. In addition, many areas may be undesirable for camping, hiking, and other recreational activities that need a green-forested landscape to attract recreational users.

3.10.3 ENVIRONMENTAL EFFECTS

3.10.3.1 ALTERNATIVE 1: NO ACTION

The no-action would have no direct impact to the recreation resource; however, another large destructive wildfire in the project area in 1-2 decades from the fuel buildup would have adverse effects by a further reduction in the scenic quality of the area. Green forested areas of the Long Pines Unit that were not affected by the Kraft Springs Fire could be burned in the future by another large fire if high levels of post-fire fuels are not removed.

3.10.3.2 EFFECTS COMMON TO ALL ALTERNATIVES

The project activities of fuel reduction treatments would negatively affect recreation in the short-term due to the disruption of scenic quality and would impede traffic along Snowcreek Road due to the mechanized equipment. There would also be a negative effect from the noise of the equipment. These effects would only last during the activity.

The silvicultural planting treatments would have a long-term beneficial effect to the recreation value of the area. The treatments would reforest the affected stands and would provide big game habitat and cover in the future. A restoration of the forested character would increase the use of the area for recreational activities that are scenery dependent.

3.10.3.3 EFFECTS OF ALTERNATIVE 2-PROPOSED ACTION

The improvement of existing roads through reconstruction/improvement on major access roads, and road maintenance on existing secondary roads would have a beneficial long-term effect for recreation. As automobile travel is the greatest developed recreation use, improving the condition of the roads has a positive impact.

3.10.3.4 EFFECTS OF ALTERNATIVE 3

This alternative would improve the condition of existing roads through improvement on major access roads. No road maintenance would occur on existing secondary roads. As automobile travel is the greatest developed recreation use, improving the condition of the roads has a positive impact.

3.10.4 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the recreation resource from past, present, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.10.4.1 DISCUSSION

The proposed project would treat forested stands by salvage harvest and noncommercial cutting of dead and dying fire-killed trees. This would reduce the recreational value in treated areas for the short-term during the project activities. The Kraft Springs Fire has further reduced the visual quality and recreational value of that portion of the land unit until the blackened scorched trees and shrubs fall. There continues to be a reduction in quality in some peoples' viewpoint due to not being able to see large stands of large diameter trees. The quality of the long distance viewing was increased by the wildfire due to the increase in sight distance by removal of the tree stands. The past and present fuel reduction projects have and continue to have short-term negative impact to recreation from smoke and reduce visual quality. In the long-term these projects would have a positive impact to recreation from improved hunt quality due to improved forage quality and quantity for wildlife. Restoration of campground facilities at Wichham Gulch and Lantis Springs are proposed and would improve the recreational value for the Long Pines Land Unit. Potential decommissioning of unneeded roads would restrict vehicle use of those areas for dispersed recreation viewing, camping, and hunting. Any proposal for road decommissioning would still need public discussion and completion of a NEPA document before a decision is made.

3.11 ECONOMICS

3.11.1 INTRODUCTION

The proposed project would affect the economies of both Carter County, Montana and Harding County, South Dakota. The economy of the community where the sawlogs are processed would also be affected. This section will discuss the potential economic effects (benefits and costs) associated with the implementation of each alternative for the Kraft Springs Project. Economic effects, including direct, indirect, and cumulative will be disclosed. Effects will be quantified where possible, and when not, qualitative discussions will be referenced. The dollar values used in the analysis and presented in the report are approximate. When applied consistently throughout the analysis, they give a relative value to compare alternatives. These values are not intended to be a precise measure of an alternatives economic effect. This section will also discuss the methodology and analytical basis for the comparison of alternatives.

Present Net Value (PNV) is used as an indicator of economic efficiency and is used in conjunction with other factors in the decision-making process. Present Net Value combines benefits and costs that occur at different times and discounts them into an amount that is equivalent to all economic activity occurring in a single year. Other economic indicators are: timber volume harvested; sale value or timber stumpage and costs of various restoration treatments or improvements. Economic impacts are displayed as employment and employee compensation estimated to result from implementation of each alternative.

Economic Efficiency considers the benefits and costs associated with implementing each alternative. This analysis will display market costs and benefits, although there are many non-market benefits and costs that will not be assigned dollar values. Examples of non-market benefits that will not be included in this analysis are watershed and wildlife habitat improvements, and fuel reduction to lower the risk of future wildfire. Examples of non-market costs would be erosion, or loss of wildlife cover and security. This report will focus on the market costs and benefits of implementing proposed activities of the alternatives and will rely on the various specialist's reports to identify the non-market benefits and costs that implementation would produce for each resource covered by this EA. For example, Alternatives 2 and 3 would each invest $3,225,000 on road improvements, and $3,450,540 on reforestation. Specialist's reports will discuss the qualitative non-market benefits of these activities while this economic report shows the market costs. Table III-43 displays the cost of each proposed activity by alternative and total project cost by alternative. The cost of environmental document preparation is assigned to each alternative, including the No Action Alternative; these planning costs are incurred regardless of the final alternative chosen in the Decision Notice.

Management of the forest is expected to yield positive benefits, but not necessarily financial benefits. Economic effects are assessed within the managerial context of the Forest Plan, as a part of an integrated approach to multiple-use management. Net public benefits represent the sum of priced outputs (PNV) plus the net benefit of non-priced outcomes. Net public benefits cannot be expressed as a dollar value because many of the outcomes of management are not quantifiable in monetary terms.

Economic Impacts in this analysis are displayed in Table III-44 as employment and employee compensation estimated to result from the implementation of each alternative. Estimates of job and income impacts were made with IMPLAN Input-Output models [13](IMPLAN, 1999). IMPLAN estimates combine direct, indirect and induced effects into the total impact. The measure for "jobs" includes both full and part-time jobs. The measure for "income" is employee compensation. The Kraft Springs Project impact area (the counties affected by implementation) was based on U.S. Department of Commerce, Bureau of Economic Analysis, Economic Areas[14] (Johnson, 1995). These areas are defined as functioning economies based on commuting patterns. Each economic area includes, as far as possible, both the place of work and the place of residence of the labor force. Carter County, Montana and Harding County, South Dakota are two counties that are likely to experience a larger proportion of the economic impacts because of their proximity to the project site.

The job and income estimates reflect the level of economic activity in the impact area if all of the management activities included in the alternative were to occur in a single year. Most of the activity would actually take place over a period of three to five years, but some of the activities may extend beyond this time frame. While useful for comparison from one alternative to another, the actual job and income activity in the impact area would be much less in any given year than the figures displayed in Table III-44. Most of the forest management related economic activity would occur in the first one to three years of implementation and then taper off until all activities are completed sometime after year 2008. The employment figure of 427 for Alternative 2 shown in the table includes both full and part-time jobs spread over the entire implementation period. Table III-44 shows job and income impacts associated with each category of activity included with each alternative.

3.11.1.1 ANALYSIS METHODS

The analysis deals with project-level financial attributes (predicted costs and revenues) of each alternative. Alternative 2 includes fuel treatment combined with timber harvest. The Transaction Evidence (TE) appraisal system (PLATA) estimates the predicted stumpage value of timber as if the sales were sold in March of 2003. The actual appraised value of forest products could change between now and the time of advertisement and contract award, due to changes in the lumber market.

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[13] IMPLAN Input-output analysis uses an economic model that describes (accounts for) all dollar flows of commodities between all sectors of an economy. IMPLAN (IMpact Analysis for PLANning) is a computer-based system that constructs an input-output model, with regional accounts and a predictive model (Minnesota IMPLAN Group, Inc. 1999).

[14] Johnson, Kenneth P., "Redefinition of the BEA Economic Areas", Survey of Current Business, US Dept. of Commerce, Feb. 1995.

Costs for various vegetation and road management activities are based on experienced costs and professional judgment. Non-harvest costs, such as fuel reduction, reforestation and road improvements not associated with the timber sale, are included in the PNV analysis, but are not included in the appraised timber value. Detailed costs are included in the Project File.

Non-commodity values were not included in this analysis because these resources are evaluated under each specific resource section. Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) indicated "For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations". Effects on resources are documented in individual resource sections.

The Northern Region's Project Level Analysis of Treatment Alternatives (PLATA) and Custer National Forest Economic Impact analysis spreadsheets were used to calculate the economic effects of each alternative. Additional information on unit costs and sale revenues used to develop PNV estimates; PLATA reports and spreadsheets to summarize IMPLAN employment and income impacts are included in the Project File.

3.11.2 AFFECTED ENVIRONMENT

From an economic perspective, the primary affected environment is the counties and communities immediately adjacent to the project area that would receive economic impacts from actions resulting from each alternative. Other secondarily affected environments would be communities that are somewhat reliant on the Sioux Ranger District as a source of wood fiber for their mills. The communities possibly affected would be Ashland, Montana; Sheridan, Wyoming; Hulett, Wyoming; and Spearfish, South Dakota. Historically, mills in each of these communities have purchased timber sales on the Sioux Ranger District and the surrounding area.

The project area is located in Carter County in southeastern Montana. Project economics would also affect Harding County, South Dakota. Carter County has a population of approximately 1,360 people, and Harding County has a population of approximately 1,353 people. These 2000 population estimates have decreased 9.5% and 18.9% respectively, since the 1990 census *(U.S. Census Bureau 2000)*.

Ekalaka is the principal community and economic center of Carter County. Buffalo and Camp Crook are the principal communities and economic centers of Harding County. Both counties contain several other very small communities.

Typical of much of the economic history of southeastern Montana and northwestern South Dakota, the economies of both counties have evolved largely around agriculture (ranching, farming and timber) and to a lesser extent, on oil and gas development in Harding County *(*See Table III-42*)*. These industries remain the driving economic force for both counties to this date. Recreation is a very small component of the economy in both counties, and is generally associated with that derived from big game hunting (deer, antelope, turkey).

Table III-42: Selected Demographic and Economic Characteristics[15]

Census Information	Carter County		Harding County	
Year - US Census Data	1990	2000	1990	2000
Population	1,503	1,360	1,669	1,353
Employment (Jobs)				
Total	827	743	800	681
Agriculture, Forestry, Mining	517	421	450	370
Construction	14	35	33	33
Retail and Service	123	140	173	127
Health and Education	75	98	73	70
Unemployment Rate	1.2%	0.5%	1.2%	1.6%
Median Household Income	$16,458	$26,312	$20,217	$25,000

The extent to which Federal land management activities would have an impact on a county's economy would be dependent in part upon the amount of management activity and revenue generated from federal lands within the county.

The U.S. Government does not pay property tax to counties for federal lands within the county. To offset this lost property tax revenue, the U.S. Government makes payments to counties, called payment in lieu of taxes (PILT). In addition to PILT payments, approximately 25% of revenues from timber sales, grazing fees and other fees and receipts generated from National Forest lands are paid to the affected counties. On October 30, 2000, the "Secure Rural Schools and Community Self-Determination Act of 2000" (Public Law 106-393) was signed into law. Under this law Counties were given the option of staying with the "25% fund payment" process or could elect to go with the "full payment" process as provided for under the new law. The "full payment" amount is based on the average of the three highest 25% payments made from fiscal year 1986 through fiscal year 1999. Both Carter and Harding counties elected the "full payment" option. Combined federal payments to Carter and Harding counties in 2001, including PILT payments and revenues derived from management activities on federal lands, were $108,002 and $110,011 respectively. Not with standing these payments; management activities on federal lands still directly and indirectly affect local economies through the federal salaries and jobs, goods and services that are produced by them.

[15] Source: U.S. Census Bureau, Census 1990. (Government Information Sharing Project, website); U.S. Census Bureau, Census 2000. (www.census.gov).

3.11.3 ENVIRONMENTAL EFFECTS

3.11.3.1 EFFECTS COMMON TO ALL ALTERNATIVES

The Northern Region Project Level Analysis of Treatment Alternatives (PLATA) and the National Fire Plan Employment and Income Effects Analysis based on data from IMPLAN for the Custer National Forest were used to analyze the alternatives.

The estimated cost of environmental document preparation, $228,000, is a sunk cost and is applied to each alternative. By comparing the cost of each management activity with the level of outcomes and the description of effects in the specialist's report for that resource, the reader can get a sense of any tradeoffs associated with the activity. Timber harvest is the only proposed activity that has a revenue component as well as costs. Proposed fuel reduction, reforestation, and road improvements only have a cost component.

State and local economies are directly and indirectly affected by the monetary inputs this project represents. Timber products provided to the raw material markets through direct timber sales contribute to the continuing operation of regional mills. This adds directly and indirectly to the local and state economies through employment and tax revenues. This project represents opportunity for input to local and regional economies because of the proposed harvest, road, and fuel reduction activities. Alternative 2 would create employment opportunities in the wood products industries. Employment would also be available in the fuel reduction, reforestation, and road improvement projects under Alternatives 2 and 3.

3.11.3.2 ALTERNATIVE 1: NO ACTION

This alternative proposes no action and produces no economic outputs. Project planning costs are sunk costs incurred initially. Planning costs for the project is estimated at $228,000. This value is based on the NEPA planning contract cost of $208,000 plus local and Forest cost of about $20,000. This cost is incurred regardless of the alternative selected. This planning cost would generate four jobs and $62,000 in employee compensation. There is no return on this investment. No timber would be harvested and no fuel reduction, reforestation, or road improvement would be done.

No benefits, (direct, indirect or non-quantifiable) can be attributed to this alternative. No value associated with harvesting fire-damaged or fire- killed trees is recovered. The Present Net Value (PNV) discounted to CY 2002 dollars is -$228,000. Economic impacts are minimal compared to other alternatives.

3.11.3.3 ALTERNATIVE 2: PROPOSED ACTION

Alternative 2 proposes a variety of treatment activities including a salvage sale of 21,093 CCF (9.6 MMBF) with fuel reduction on 6,260 acres, immediate non-commercial fuel reduction on 1,980 acres, delayed non-commercial fuel reduction on 2,650 acres, reforestation/tree planting on 7,860 acres, 20.5 miles of temporary road construction, 82 miles of road maintenance, 184 miles of road closures during the Montana big game rifle hunting season, and 67 miles of system road improvement.

The total direct costs for Alternative 2 are shown in Table III-43 and include NEPA planning, sale preparation and administration, fuel reduction, reforestation, and road improvements, estimated at $8,908,750. Economic impacts of these proposed activities are 427 jobs created and $7,123,000 employee compensation displayed in Table III-44.

Revenue generated from the sale of fire killed timber is a direct benefit. The TE appraisal (PLATA analysis) for harvesting 21,093 CCF (9.6 MMBF) of timber indicated a high bid stumpage value of $50.20/CCF or a total net sale value of $1,058,870. Discounted or the Present Value (PV) of product sales is $1,018,140. Economic impacts of timber harvest on Alternative 2 are 165 jobs created and $4,105,000 generated in employee compensation. Fire killed trees would be provided for the local and regional economy while reducing fuels on the harvested acres.

The Present Net Value (PNV) for all costs plus the revenue generated from the sale of timber for Alternative 2 is -$7,189,200 which indicates the cost of the non-timber sale related fuel treatments, reforestation, and road improvements exceed the timber sale value (See Table III-45). As indicated in the appraised timber sale value, when only the resource work needed for timber harvest is included the timber sale has a $1,018,140 positive value. It is assumed funding would be provided over time, for non-timber sale related activities, with National Fire Plan dollars. Non-quantifiable benefits are discussed in other sections of the document.

3.11.3.4 ALTERNATIVE 3

Alternative 3 proposes fuel treatments similar to Alternative 2, immediate non-commercial fuel reduction on 5,170 acres, delayed non-commercial fuel reduction on 5,730 acres, reforestation/tree planting on 7,860 acres, 184 miles of road closures during the Montana big game rifle hunting season, and 67 miles of system road improvement.

There is no timber harvest proposed on Alternative 3, therefore, no revenue generated from the sale of timber. The total direct cost of implementing Alternative 3 is estimated at $9,789,920, shown in Table III-43.

Economic impacts are based on IMPLAN model data using Custer National Forest data to determine employment and income effects. Estimated economic impacts from fuel reduction, planting, and road improvement are 278 jobs and $3,216,000 in employee compensation (See Table III-44). This results in 149 (53 percent) fewer jobs than Alternative 2.

With no revenue generated from sale of timber in Alternative 3, all proposed activities would be funded from appropriated dollars. It is assumed that this funding would be available over time and all or part would be National Fire Plan money. The Present Net Value discounted to CY 2002 dollars, is -$8,520,580 with all treatments and road improvement work combined, shown in Table III-45. Non-quantifiable benefits are discussed in other sections of the document.

3.11.4 SUMMARY

Alternative costs are broken into two categories, administrative and activity. Administrative costs include Forest Service costs associated with the planning and implementation of the project. Activity costs include all costs of completing the project. These costs can be measured quantitatively, but many benefits can only be measured qualitatively. Administrative costs were analyzed in a range of years from one to five with a base year of CY 2002. For the purpose of this analysis, activity costs were analyzed based on the year that the activity is most likely to occur. Activities would likely occur over a 7 to 8-year period between CY 2003 and CY 2010. All costs have been discounted to CY 2002 dollars. Logging and road maintenance costs associated with the commercial timber harvest are included in the TE appraisal, PLATA analysis and have been subtracted from the gross sale value.

The quantifiable costs for each treatment type by alternative are summarized in Table III-43 below:

Table III-43: Summary of Project Activities Costs and Revenues, Timber Volume, Acres and Costs/Acre

Costs / Revenues	Alternative 1	Alternative 2	Alternative 3
Volume of Harvest (CCF)	0	21,093	0
(MMBF)	0	9.6	0
Acres Harvest/fuel Reduction	0	6,260	0
Commercial Harvest (Revenue)	0	$1,058,870	0
Revenue/Acre	0	$169.15	0
Administrative Costs			
Planning & Documentation	$228,000	$228,000	$228,000
Sale Prep and Harvest Admin(1)	0	$250,000	0
Immediate Fuel Reduction, Harvest Area			
Hand Fell	0	$13,500	0
Prescribed Burn	0	$10,000	0
Machine Fell/Pile	0	$647,570	0
Burn Piles	0	$44,660	0
Immediate Fuel Reduction			
Hand Fell	0	$49,005	$51,150
Prescribed Burn	0	$29,700	$31,000
Machine Fell/Pile	0	$341,649	$986,580
Burn Piles	0	$23,562	$68,040
Delayed Fuel Reduction			
Hand Fell	0	$56,760	$56,595
Prescribed Burn	0	$34,400	$34,300
Machine Fell/Pile	0	$468,118	$1,093,561
Burn Piles	0	$32,284	$75,418
Subtotal Fuel Reduction	0	$1,751,208	$2,396,644
Total Acres of Fuel Reduction	0	10,890	10,900
Total Fuel Treatment Cost/Acre	N/A	$160.81	$219.88
Planting	0	$3,285,480	$3,285,480

Table III-43: Summary of Project Activities Costs and Revenues, Timber Volume, Acres and Costs/Acre

Costs / Revenues	Alternative 1	Alternative 2	Alternative 3
Planting Acres	0	7,860	7,860
Planting Cost/Acre	N/A	$418.00	$418.00
Regeneration Exams	0	$165,060	$165,060
Subtotal Reforestation	0	$3,450,540	$3,450,540
Total Reforestation Cost/Acre	N/A	$439.00	$439.00
Roads			
Road Improvement (2)	0	$3,225,000	$3,225,000
Road Restriction Signing	0	$4,000	$4,000
Subtotal Roads	0	$3,229,000	$3,229,000
Miles of Road Improvement		67	67
Road Work Cost/Mile	N/A	$48,194	$48,194
Total Costs	**$228,000**	**$8,908,750**	**$9,304,180**
Present Value – Total Costs	**$228,000**	**$8,207,340**	**$8,520,580**
Total Revenue		**$1,057,870**	
Present Value-Total Revenue		**$1,018,140**	

(1) Sale preparation and harvest administration are actual cost estimates for Kraft Springs Project (PLATA Report).

(2) Road engineering costs are included in the total road improvement cost estimate (PLATA Report).

Economic impacts for each alternative are summarized in Table III-44. These numbers were generated using the National Fire Plan Employment and Income Effects for the Custer National Forest with IMPLAN model data.

Table III-44: Jobs Created and Employee Compensation from Project Activities

	Alternative 1	Alternative 2	Alternative 3
Planning & Documentation			
Employee Compensation	62,000	62,000	62,000
Jobs	4	4	4
Commercial Harvest			
Employee Compensation	0	$4,105,000	0
Jobs	0	165	0
Fuel Reduction			
Employee Compensation	0	$537,000	$736,000
Jobs	0	43	60
Reforestation			
Employee Compensation	0	$1,357,000	$1,357,000
Jobs	0	157	157
Road Improvement			
Employee Compensation	0	$1,062,000	$1,062,000
Jobs	0	57	57
Total Employee Compensation	62,000	$7,123,000	$3,216,000
Total Jobs (1)	4	427	278

(1) Total jobs difference is rounding within the IMPlAN model.

Table III-45 summarizes Present Value of revenues, total project costs, total project PNV. These values are calculated using benefits and costs that have been discounted to CY 2002 dollars.

Table III-45: Summary of Costs, Revenues, and PNV by Alternative

Alternative	Present Value Revenue	Present Value Cost	Present Net Value
Alternative 1	0	$228,000	-$228,000
Alternative 2	$1,018,140	$8,908,750	-$7,189,200
Alternative 3	0	$9,304,180	-$8,520,580

3.11.5 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the economics from past, present, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.11.5.1 DISCUSSION

The economic effects of past management activities within the Long Pines land unit are not known, records documenting them do not exist. There are no other scheduled out year projects within the Long Pines land unit. A future event that could have economic affects on the project area and the local economy is the occurrence of another large wildfire like the Brewer Fire of 1988 or Kraft Springs Fire in 2002. If fire killed trees remain on site fuel conditions for another high severity wildfire would be retained. To that extent, Alternative 1 poses the greatest risk of a large wildfire occurring within the project area, as it does nothing to curb or reduce the buildup of hazardous fuels. As a result, it poses the greatest risk of future costs and economic loss. The average wildfire suppression cost on National Forest land for Fire Season 2000 was $480 per acre (www.nifc.gov/stats/). In addition to these suppression costs, there would be costs associated with land restoration, loss of resource values, and possible loss of structural improvements.

In addition to this project, foreseeable future road decommissioning is possible and would be analyzed under another NEPA document. The amount of jobs and local revenue generated from road decommissioning would not be known until the actual site specific activities are proposed and assessed.

3.12 TRANSPORTATION SYSTEM

3.12.1 INTRODUCTION

This analysis section provides for the economic development and management of the transportation system and to ensure implementation of the Forest Plan. The use of timber harvesting in part, as a tool to reduce fuel hazards in the Kraft Springs Project area is driving the need for road improvements.

A Forest-scale roads analysis was completed for maintenance level 3, 4, and 5 roads in 2003. In addition, a roads analysis for maintenance roads 1 and 2 was completed for the Long Pines Land Unit in 2003. The road analyses were developed to meet identified resource needs.

3.12.2 AFFECTED ENVIRONMENT

Primary access into the proposed project is provided by State Highway 20 (South Dakota) and State Highway 323 (Montana). In Harding County, South Dakota, County Road 867 and the Mill Iron road provide access for public lands as well as extensive private lands on the north and east side of the Long Pines Land Unit.

Figure III-14: Mill Iron Road access to Long Pines Land Unit

In Carter County, Montana, the Tie Creek, Belltower, Prairie Dale, and Mill Iron roads (See Figure III-14) provide access for public lands as well as extensive private lands for the entire area. These roads currently support considerable commercial livestock hauling. The addition of timber haul is not expected to be a significant impact to the State and County roads. Seasonal weight restrictions can be expected to protect the road surfacing on these roads.

There are six public access routes into the Long Pines Land Unit. These routes eventually come together in the south central portion of the Long Pines Land Unit at a place referred to as Four Corners. As such, these routes create a loop effect whereby a person may enter and leave National Forest System lands through a number of ways without having to back track. Table III-46 lists each of these access routes along with the most current traffic count information where available.

Table III-46: Long Pines Access Routes and Traffic Counts

Access Route	Traffic Count Period	Total Traffic Count for Period	Average Daily Vehicle Use
Snow Creek Road #3117	N/A	Data Not Available	Data Not Available
Pendleton Road #3048	N/A	Data Not Available	Data Not Available
Plum Creek Road #3118	N/A	Data Not Available	Data Not Available
Capitol Rock Road #3116	06/06/02 – 07/08/02	335	10.15
Exie Road #3119	06/06/02 – 07/09/02	195	5.73
Speelman Creek Road #3818	06/06/02 – 07/08/02	63	1.90

The transportation system within the Kraft Springs analysis area is comprised of approximately 228 miles of existing roads on National Forest System lands, with all roads classified as single lane. Currently, few roads are closed yearlong, resulting in an open road density of approximately 2 miles per section. Access for resource management takes into consideration soil and water resources, public safety, economy of access, wildlife and other resource needs.

Road use within the Long Pines Land Unit and the project area is light, with the highest use occurring during the Spring Turkey hunting season (April – May) and the fall big game hunting season (October – November). Aside from use by hunters, other road users include grazing permittees and administrative traffic. Road use by the public in pursuit of other recreational opportunities is very light. The Snow Creek Road also serves as the access route to the summer home tract in Sections 4 and 5, T2S, R61E. During years of normal snowfall, there is no road use from December through March, as no attempt is made to keep roads open once they snow in or drift shut.

Snow Creek Road (NFSR 3117) is the collector road providing the primary north-south access for the Long Pines Land Unit and project area. The operational and objective maintenance is level 3 – suitable for passenger vehicles. The road is not currently maintained to level 3 standards because the design, drainage and surfacing are not adequate. The south 7.7 miles of this road was reconstructed in the late 1970's and early 1980's and has a gravel surface. Current conditions of portions of the road (especially the north nine miles) would not support timber haul. The lack of surfacing on the northern portion of the road limits access during wet weather due to the amount of clay in the native material (See Figure III-15). The ruts and braided roads resulting from use during wet weather prevent passenger vehicle access even during dry conditions.

Figure III-15: Snow Creek Road, Kraft Springs Project

The CCC originally improved Snow Creek Road in the mid-1930's. Many of the drainage structures are considered historical, requiring protection. Road design and construction to bring the road up to standard may involve disturbing these features. Some avoidance is possible, but not all structures can be protected

The existing local road system provides sufficient access for resource management needs including recreation, range and fire. The operational and objective maintenance of local roads is generally level 2 – suitable for high clearance vehicles, with a few roads at level 1 – closed to vehicular traffic. Many of the level 2 roads are not currently maintained to standard, largely due to a lack of funding, but also in part because, design and drainage are not adequate. Additional roadwork is needed for timber harvest. Unclassified roads are present throughout the planning area. Some are located in meadows and open areas where it is difficult to control access. Some roads, both classified (system) and unclassified (non-system), provide redundant access. Opportunities for reciprocal right-of-ways and shared maintenance are an alternative to duplicate roads.

The current level of road maintenance funding is inadequate to maintain open road standards. Combined funding sources for deferred and annual maintenance needs have not been developed for the management unit.

3.12.3 ENVIRONMENTAL EFFECTS

The Sioux Ranger District completed a roads analysis for the planning area. The recommended transportation system from the roads analysis would close most unclassified roads, close some currently classified roads, and restrict use on some of the classified roads. The total miles of National Forest System Roads would vary little between alternatives, with approximately 80 miles of road identified as the minimum road system necessary to manage the area.

Roads recommended for restricted use would be limited to occasional use by the Forest Service and authorized permittees and contractors. These roads would be closed with signs (with or without gates) describing the road restrictions. Reconstruction activity would bring road standards up to the minimum necessary to accommodate commercial timber haul while protecting soil and water resources. Design attributes for the reconstructed local roads include: use of native surfacing, minimized use of culverts in favor of rolling dips (armored with pit run gravel), use of existing road width, out-sloping of road where needed, designing roads for limited use and high clearance vehicles, and minimized use of turnouts. Conflicts between log haul and public use would be handled through use of closure orders and/or log haul restrictions. The new construction that would be needed to access commercial timber varies slightly by alternative. The newly constructed roads are needed for future management in the area and are considered an addition to the existing road system and would be built to the same standard as the reconstructed local roads. Temporary roads would also be needed to access portions of proposed units. All temporary roads would be closed following sale activities.

Reconstruction needs on Snow Creek Road (NFSR 3117) are a high priority to bring the road up to standard and provide resource protection. Rutting due to lack of sufficient drainage and surfacing material is a concern on the unsurfaced portion of this road. The entire length of the road needs additional road width, turnouts, reshaped ditch, additional ditch-relief culverts, and culvert replacements for both capacity and length. Unsurfaced segments would be surfaced with gravel. Alternatives 2 and 3 would all use the existing alignment for reconstructing this road. Minor alignment adjustment would occur to correct user safety and drainage deficiencies.

The development of new surfacing sources needs to be explored. The Lantis Pit (sw ¼, Sec 26, T2S, R61E) on the Long Pines Unit was used in 1984 for the reconstruction of Snow Creek Road. The pit has since been reclaimed. Preliminary reviews of the surrounding area show promise for similar rock. Test pits would show the feasibility of developing a new pit in the area for long-term use.

Roads recommended for closure or restricted use would be closed with signs (with or without gates) describing the road restrictions. To provide wildlife security, 184 miles would be closed during the Montana big game rifle season.

For short-term use, private gravel pits on the north end of the Long Pines Unit may provide surfacing material. The County also has some gravel pits where a joint use agreement could be worked out for use of the material. The following table summarizes the road system by alternative.

Table III-47: Transportation System by Alternative

Transportation System	Alternative 1	Alternative 2	Alternative 3
Travel Management - miles			
Total Road Miles	228	228	228
Hunting Season Closure - miles	0	184	184
Road Work - miles			
Improvement with NFP $ - miles	0	67	67
Temporary Road Construction	0	20.5	0
Road work - Cost			
Road Maintenance, Timber Sale	$0	$122,339	$0
Road Improvement, NFP $	$0	$3,227,500	$3,227,500
Temporary Road Construction	$0	$19,475	0
Hunting Season Closure, Signing	$0	$4000	$4000
Total Cost	$0	$3,373,314	$3,231,500

NFP: National Fire Plan funded

3.12.3.1 ALTERNATIVE 1: NO ACTION

On this alternative the road system would continue to deteriorate and travel management would continue to be a concern. The unclassified road system would remain in place with continued use. There are currently 228 miles of roads open for public use in the project area.

3.12.3.2 ALTERNATIVE 2: PROPOSED ACTION

This alternative would maintain and improve 82.0 miles of existing roads and construct 20.5 miles of temporary roads for timber harvest. These temporary roads would be closed and re-vegetated after use (about one year). Reconstruction or improvement would also be done on 67.0 miles of existing system roads with appropriated National Fire Plan dollars. Alternative 2 would close 184 miles of roads (now open to the public) during the Montana big game rifle-hunting season. Implementing this Alternative would leave 44 miles of system roads in the Long Pines land Unit planning area, open for public use during hunting season.

3.12.3.3 ALTERNATIVE #3

Road use for Alternative 3 is similar to Alternative 2. As in Alternative 2 reconstruction or improvement would be done on 67.0 miles of existing roads with funding from appropriated NFP money. Alternative 3 would also close 184 miles of roads (now open for public use) during the Montana big game rifle-hunting season. Implementing this alternative would leave 44 miles of system roads in the planning area, open for public use during hunting season.

3.12.4 CUMULATIVE EFFECTS

This section will disclose any cumulative effects on the transportation system from past, ongoing, and reasonably foreseeable future actions. See Section 3.13, Cumulative Effects Activities for an additional summary discussion of cumulative effects activities. A complete detailed list (with maps) of past, present, and reasonably foreseeable future actions is found in the project files.

3.12.4.1 DISCUSSION

Road maintenance would be scheduled according to need and the level identified for each road. Level 3-road maintenance is currently planned annually. Intensive maintenance on the level 1 and 2 roads is scheduled as funding becomes available, with safety items corrected as they are identified. Purchaser maintenance during the commercial harvest would protect soil, water, and other resources.

A foreseeable future activity would be decommissioning 34 miles of classified and unclassified roads for resource protection. Decommissioning would be accomplished with physical barriers including berms, rocks, slash, signs, or gates. Decommissioned roads would be re-vegetated through scarification and seeding. This future road decommissioning would be analyzed under a separate NEPA document.

3.13 CUMULATIVE EFFECTS ACTIVITIES

This section will summarize the analysis area and the temporal scale (time) considered for the cumulative effects analysis. In addition, a summary list of cumulative effects activities is presented. Each resource section in this chapter has disclosed the specific cumulative effects for that particular resource area. Refer to those sections for a specific discussion of cumulative effects.

3.13.1 SCOPE OF THE CUMULATIVE EFFECTS ANALYSIS

The area chosen for the cumulative effects analysis is the entire Long Pines Land Unit managed by the Custer NF. The reason for this area being selected is that the Sioux Ranger District manages land units that are islands of forested landscape in the larger prairie-grassland ecosystem. Many miles separate these forested islands from each other, and the effects of management tend to be restricted to each land unit. The Long Pines Land Unit is approximately 70,000 acres and is the same as the Kraft Springs Project area. Surrounding lands are primarily private lands managed for livestock use, with a minor amount of lands managed by the Bureau of Land Management to the northeast of the project area, and will not be considered in detail in this analysis.

The temporal scale (time limits for past activities) selected for this project is from the 1988 Brewer Fire to the present. This large wildfire and the 2002 Kraft Springs Fire had significant impacts on the forested vegetation in the Long Pines Land unit and the subsequent post-fire management activities that resulted from those wildfires are within a timeframe where the impacts can overlap with the Kraft Springs Project.

3.13.2 PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

The following list of cumulative effects activities is a summary; a detailed list of cumulative effects activities considered for this project is presented in the project files. Maps showing these activities in relationship to the Kraft Springs project area is also found in the project files.

The following table summarizes those past, ongoing and foreseeable future activities with a description of the activity and the acres affected.

Table III-48: List of Cumulative Effects Activities

Project Name[1]	Activity Type	Acres	Date
Past Activities			
Brewer Wildfire	Unplanned Wildfire	58,000 acres, (45,000 acres on FS Lands)	1988
Ward Salvage and other smaller post-fire salvage	Clearcuts, sanitation harvest, seed-tree cuts, and	Approx 2,000 acres of treatments	1988-1989

Table III-48: List of Cumulative Effects Activities

Project Name[1]	Activity Type	Acres	Date
projects	intermediate harvest salvage		
Rustler, Plum Creek, South Snow Creek, Kennedy Well, and Latham Well	Prescribed burns and thinning for fuels reduction	Approximately 4,700 acres	1996-2001
Kraft Springs Fire	Unplanned wildfire	Approximately 65,550 acres, 43,300 of that on FS lands.	2002
Ongoing Activities			
Existing Range Allotments	Livestock Grazing	Entire NLP project area	Ongoing
Ongoing Noxious Weed Control	Noxious Weed control	NA	Ongoing
Kraft Springs Fire BAER	Fire emergency rehabilitation activities including road repair, culverts, and hazard tree removal.	Various post-fire emergency rehabilitation projects. See Appendix C for detailed list.	2002-ongoing
Future Activities			
Kraft Springs Fire National Fire Plan project requests	Numerous rehabilitation and restoration projects	See appendix C for detailed project proposals	When funded

[1] Small activities not considered significant to this analysis are not listed in this summary.

3.14 REQUIRED DISCLOSURES AND UNIQUE CHARACTERISTICS

This section discloses information and impacts to unique characteristics of the Kraft Springs Project and the Long Pines Land Unit. In addition, required disclosures are listed and impacts are noted.

3.14.1 MUNICIPAL WATERSHEDS

No municipal watersheds occur in the Long Pines Land Unit including the project area; therefore there would be no impacts on municipal watersheds.

3.14.2 CONGRESSIONALLY DESIGNATED AREAS

Wilderness: There are no lands designated on the Sioux Ranger District including the Long Pines Land Unit and project area as Wilderness; therefore there would be no impacts on Wildnerness.

Wilderness Study Areas: There are no lands designated on the Sioux Ranger District including the Long Pines Land Unit and project area as Wilderness Study Areas (WSA) or recommended for wilderness classification; therefore there would be no impacts on any WSA.

National Recreation Areas: There are no lands designated on the Sioux Ranger District including the Long Pines Land Unit and project area as National Recreational Areas; therefore there would be no impacts on any National Recreational Area.

3.14.3 INVENTORIED ROADLESS AREAS

There are no lands designated on the Sioux Ranger District including the Long Pines Land Unit and project area classified as roadless. There are no inventoried roadless areas (IRAs) located on the Sioux Ranger District including the Long Pines Land Unit and project area; therefore, there would be no impacts on IRAs or roadless areas.

3.14.4 RESEARCH NATURAL AREAS

There are no research natural areas on the Sioux Ranger District including the Long Pines Land Unit and project area; therefore, there would be no impacts on RNAs.

3.14.5 PARKLANDS

The Long Pines Land Unit and the proposed project would not affect any parklands.

3.14.6 PRIME FARMLANDS, RANGELANDS, AND FORESTLANDS

Prime farmland*:* The Long Pines Land Unit including the project is not located in or adjacent to prime farmlands; therefore, there would be no impacts to Prime Farmland.

Prime Rangeland: the Long Pines Land Unit would not contain prime rangeland because of soils and climate, and none of the proposed activities in the Long Pines project would convert rangelands to other uses. Therefore, there would be no impacts on Prime Rangeland.

Prime Forestland: The Long Pines Land Unit including the project area would not convert forestlands to other uses. All lands designated as forested would be retained as forested, therefore there would be no impacts on Prime Forestland.

3.14.7 WILD AND SCENIC RIVERS

There are no lands designated or proposed for Wild and Scenic Rivers on the Sioux Ranger District including the Long Pines Land Unit and project area; therefore, the project would not impact any Wild and Scenic Rivers.

3.14.8 LANDMARKS

The Kraft Springs Project area contains one National Natural Landmark that was established upon recommendation by the USDA Forest Service and the USDI Park Service in 1977. This Natural Landmark (Capitol Rock) is situated in Management Area O with the goal to protect unique geological and scenic features. Capitol Rock National Natural Landmark is a sandstone formation resembling the Nation's Capitol building. The Landmark is located in T3S, R62E, Section 17. The landmark is within the Kraft Springs project area;, however no project activities would impact that area. Some road maintenance of the adjacent road would occur but would not affect the unique features.

3.14.9 WETLANDS (EXECUTIVE ORDER 11990)

The Long Pines Land Unit including the project area does not contain wetlands as defined by E.O. 11990. Therefore, the project would not have any impacts on wetlands.

3.14.10 FLOODPLAINS (EXECUTIVE ORDER 11988)

The Kraft Springs project and adjacent areas do not contain floodplains as defined by E.O. 11988. Based on ESRI/FEMA Flood Hazard Maps and the secondary analysis, the proposed Kraft Springs projects are not located in a floodplain and therefore, the project would not impact any floodplains.

3.14.11 UNAVOIDABLE ADVERSE EFFECTS

There would be unavoidable short-term (<10 years) adverse effects in terms of soil disturbance, soil displacement, and some minor soil compaction. There would be unavoidable short-term adverse effects on some wildlife species. No T&E wildlife species would be affected, and none of these short-term impacts are considered to be significant.

3.14.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

There are no irreversible or irretrievable commitments of resources as a result of implementation of the project alternatives. Treatment areas in the burned area would be returned to forest production and range forage production as normal restoration processes.

3.14.13 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The project does propose short-term salvage of fire-killed timber; however, the long-term productivity of soils and vegetation would be improved by the project treatments to reduce hazardous fuel loading in the long-term.

3.14.14 AIR QUALITY

This proposal would have some short-term impacts on air quality standards, due to pile burning, but air quality levels and would comply with all State and Federal air quality regulations. Any prescribed fire activities would be accomplished during weather conditions that would minimize any impacts of smoke on communities and the air quality of monitored reference sites.

3.14.15 AMERICAN INDIAN TREATY RIGHTS

This proposal would not conflict with any treaty provisions of any Tribal group.

3.14.16 CULTURAL RESOURCES

All but 183 acres of commercial salvage, 807 acres of non-commercial fuel treatment, and 645 acres of planting has been inventoried for cultural resources. With the exception of these acres all other proposed ground disturbing activities have been inventoried for cultural resources. Cultural resources identified in the project area will be protected. The project would comply with all aspects of the National Historic Preservation Act. The acreage that has not been surveyed for cultural resources is scheduled for completion following snow melt.

3.14.17 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES

The energy consumption associated with the alternatives, as well as the differences between the alternatives, is insignificant.

3.14.18 ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

Executive Order 12898 (Feb. 11, 1994) requires all Federal Agencies to make environmental justice part of each agencies mission, by identifying and addressing, as appropriate, disproportionately high, and adverse human health or environmental effects on minority populations or low-income populations. There would be no effects on minority or low-income populations by any of the alternatives for this project.

3.14.19 EVEN-AGED VEGETATION MANAGEMENT

The National Forest Management Act (NFMA) of 1976 requires the disclosure of any silviculture prescription that creates an opening larger than 40 acres, using even-aged vegetation management. The Kraft Springs Fire created the openings that are proposed for fuels reduction treatments. The project does not propose any even-aged silviculture prescriptions (clearcut, seed-tree, or shelterwood) that would create any forest openings in any green-forested site.

3.14.20 SOCIAL GROUPS

The project would have no affects on any social groups, including minorities, Native American Indians, women, or the civil liberties of any American citizen.

3.14.21 THREATENED AND ENDANGERED SPECIES (T&E)

No Threatened, Endangered, or Proposed Listed Species is known in the project area and no adverse effects would occur on any Threatened or Endangered plant or wildlife species.

3.14.22 WATER QUALITY

The Montana and South Dakota Best Management Practices for Forestry Practices, and Forest Service Soil and Water Conservation Practices' standards would be implemented to meet state and federal water quality regulations. The project would have no effect on water quality.

3.15 LIST OF PREPARERS

This section includes a list of preparers of the environmental document. The following individuals were primarily responsible for developing the environmental analysis.

Enterprise T.E.A.M.S, USDA-Forest Service

Marti Dodds
Position: Landscape Architect
Contribution: Visuals and landscape analysis

Tim Holden
Position: Wildlife Biologist
Contribution: Wildlife and fisheries analysis

Greg D. Lind
Position: IDT Leader
Contribution: IDT Leader, EA document preparation, TES plants analysis

P. Cavan Maloney
Position: Hydrologist
Contribution: Watershed and soils analysis

Neil McCusker
Position: Silviculturist
Contribution: Silvicultural and vegetation analysis

Francis Mohr
Position: Fuels/Fire Specialist
Contribution: Fuels/Fire Management Analysis

Frank Yurczyk
Position: Timber Specialist
Contribution: Economics and Transportation Analysis

CUSTER National Forest, USDA-Forest Service

Brenda Cristensen
Position: Transportation Planner
Contribution: Transportation analysis

John Clark
Position: Forest Timber Management Officer
Contribution: Timber, economics, and transportation analysis

Laurie Walters-Clark
Position: District Resource Assistant
Contribution: Recreation analysis

List of Preparers - CUSTER National Forest, USDA-Forest Service (cont.)

George Foley
Position: District Ranger, Sioux Ranger District
Contribution: IDT direction, Line Officer

John Lane
Position:Forest Soils Scientist
Contribution: Soils and watershed analysis review

Halcyon LaPoint
Position: Forest Archeologist
Contribution: Cultural analysis

Jerry Martinez
Position:Fuels Specialist
Contribution: Fuels analysis review

Dean Millett
Position: Pre-Sale Forester
Contribution: Timber, roads analysis, GIS support

Vicky Murfitt
Position: Forest GIS Specialist
Contribution: GIS information and support

Stephen "Obie" O'Brien
Position: USFS-Region 1, Logging Systems Engineer
Contribution: Logging systems and harvest methods analysis

Charlie Odell
Position: Range Technician
Contribution: Range, noxious weeds, and woody draw analysis

Jane Pedrotti
Position: Resource Assistant
Contribution: Project record, NEPA mail-lists

Kim Reid
Position: Forest Range Program Manager
Contribution: Sensitive plant analysis review

Dennis Sandbak
Position:Forest Silviculturist
Contribution: Silvicultural analysis review

Mark Slacks
Position: Forest NEPA Coordinator
Contribution: NEPA guidance and review

Tom Whitford
Position: Forest Wildlife Biologist
Contribution: Wildlife analysis and review

3.16 CONSULTATION AND COORDINATION

The following is a list of Federal and State Agencies, Tribes, State and Local Governments, Organizations, and Businesses that were sent scoping letters, responded to scoping letters, or consulted during this analysis. A complete mailing list of all contacts, including individuals, is found in the project files.

Alliance For Wild Rockies	Missoula	MT
American Wilderness Alliance	Laramie	WY
American Wildlands	Bozeman	MT
Audubon Montana Council	Helena	MT
Audubon Society	Billings	MT
Audubon Yellowstone Valley	Billings	MT
Bureau of Indian Affairs	Billings	MT
Bureau of Land Management	Belle Fourche	SD
Bureau of Land Management	Miles City	MT
Carter County Clerk/Recorder	Ekalaka	MT
Carter County Commissioners	Ekalaka	MT
Carter County Conservation District	Ekalaka	MT
Carter County Sheep & Cattle Association	Plevna	MT
Carter County State Representative	Otter	MT
Carter County State Senator	Glendive	MT
Cheyenne River Sioux Tribe	Eagle Butte	SD
Consolidated Farm Service Agency	Ekalaka	MT
Consolidated Farm Service Agency	Buffalo	SD
Crow Creek Sioux Tribe	Ft Thompson	SD
Crow Cultural Committee	Crow Agency	MT
Crow Tribal Council	Crow Agency	MT
Custer Rod & Gun Club	Miles City	MT
Doonan Gulch Outfitters	Broadus	MT
Ekalaka Eagle	Ekalaka	MT
Fallon County Commissioners	Baker	MT
Fallon County Planning	Baker	MT
Fort Peck Reservation	Poplar	MT
Grand Electric Cooperative	Bison	SD
Greater Yellowstone Coalition	Bozeman	MT
Harding County Commissioners	Buffalo	SD
Harding County Conservation District	Buffalo	SD
Harding County State Representative	Walker	SD
Harding County State Representative	Eagle Butte	SD
Harding County State Senator	Faith	SD
Harding County Stock Growers	Buffalo	SD
Inland NW Wildlife Council	Spokane	WA
Intermountain Forest Association	Rapid City	SD
Lower Brule Sioux Tribe	Lower Brule	SD
Mandan-Hidatsa / Arikara Tribe	New Town	ND
Medicine Wheel Alliance	Billings	MT
Montana Animal Damage Control	Billings	MT
Montana Board of Outfitters	Helena	MT
Montana Office of Lt. Governor	Helena	MT
Montana Dept Fish Wildlife & Parks	Miles City	MT
Montana Dept State Lands	Miles City	MT
Montana Logging Association	Kalispell	MT
Montana Outfitters & Guide Association	Seely Lake	MT
Montana State Representative	Billings	MT
Montana State Senator	Bozeman	MT
Montana Stockgrowers Association	Helena	MT
Montana Wilderness Association	Helena	MT
Montana Wildlife Federation	Helena	MT
Montana Wood Products	Helena	MT
Montana Woolgrowers Association	Helena	MT
Natural Resource Conservation Service	Bozeman	MT
National Wildlife Federation	Washington	DC
Nature Conservancy Office	Billings	MT
Neiman Sawmill Inc	Hulett	WY
North Dakota State Forester	Bottineau	ND
Northern Cheyenne Pine Company	Ashland	MT
Northern Cheyenne Tribe	Lame Deer	MT
Ogalala Sioux Nation	Pine Ridge	SD
Outdoor Information Service	Lolo	MT
People of Harding County	Belle Fourche	SD
Pope & Talbot Inc	Spearfish	SD
Powder River Outfitters	Broadus	MT
Rosebud Sioux Tribe	Rosebud	SD
Schell-Long Pines Ranch	Camp Crook	SD
SD School & Public Lands	Pierre	SD
SDSU Ext Entomologist	Brookings	SD
SDSU Plant & Science Div	Brookings	SD
Sierra Club	Sheridan	WY
Sierra Club Black Hills Group	Rapid City	SD
South Dakota Animal Damage Control (ADC)	Pierre	SD
SD. Dept Environment & Natural Resources	Pierre	SD
South Dakota Dept Game Fish & Parks	Rapid City	SD
South Dakota Dept Game Fish & Parks	Buffalo	SD
South Dakota Dept of Agriculture	Pierre	SD
South Dakota Dept of Transportation	Belle Fourche	SD
South Dakota Division of Plant Ind	Pierre	SD
South Dakota Division of Tourism	Pierre	SD
South Dakota Game Fish & Parks	Pierre	SD
South Dakota Game Fish & Parks	Lemmon	SD
South Dakota Game Fish & Parks	Pierre	SD
South Dakota State Representative	Rapid City	SD
South Dakota State Senator	Rapid City	SD
South Dakota State Senator	Rapid City	SD
Spirit Lake Sioux Tribe	Fort Trotter	ND
Standing Rock Sioux	Fort Yates	ND
Turtle Mountain Band of Chippewa	Belcourt	ND
USDA/APHIS/SD Plant Health	Pierre	SD
USDA/APHIS/Wildlife Services	Pierre	SD
Western South Dakota Fur Harvesters	Rapid City	SD
Wilderness Society	Bozeman	MT
Wildlife Society	Rapid City	SD
Wyoming Sawmill Inc	Sheridan	WY

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