Spruce Ecosystem Recovery Project Final Environmental Impact Statement

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SPRUCE ECOSYSTEM RECOVERY PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

February 1998
FINAL ENVIRONMENTAL IMPACT STATEMENT
SPRUCE ECOSYSTEM RECOVERY PROJECT
DIXIE NATIONAL FOREST
CEDAR CITY RANGER DISTRICT
Iron County, Utah
1998

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USDA Forest Service

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ABSTRACT

This Final Environmental Impact Statement documents the analysis of the Proposed Action, two action alternatives, and the No Action alternative, developed for the Spruce Ecosystem Recovery Project (SERP) area. The Proposed Action and action alternatives considered in detail are consistent with current management direction. Each alternative responds differently to the issues associated with the Proposed Action.

The Proposed Action would: (1) salvage harvest dead and dying Engelmann spruce, and remove selected green spruce and alpine fir trees using sanitation and improvement treatments, on 2,582 acres with ground-based tractor yarding systems. These treatments are designed to recover economic value, reduce fuel loadings, and more rapidly reforest areas affected by spruce beetle mortality. The treatments could also reduce the present and future risk of further loss to spruce beetle caused mortality in some portions of the SERP area. (2) regenerate 1934 acres of mature to old aspen stands with lichwood or sotn timber harvesting, or prescribed burning. These treatments are designed to increase the representation of younger age classes of aspen forests in the SERP area which would improve the biodiversity of the vegetation resource. Improving biodiversity in the area would reduce the risk of future catastrophic events such as insect and disease epidemics and wildfire. Increasing the representation of aspen would also provide benefits to the recreation resource by maintaining the species that provide the full coloration that visitors find attractive. (3) establish 41 acres of defensible fire suppression zones by reducing ladder fuels and fuel loadings along private land-subdivision boundaries as well as fuel reduction and piling of undesirable trees and wood material. These treatments are designed to provide good fire suppression personnel a place to stop or slow a wildfire in order to minimize the risk of catastrophic fire and (4) reintroduce fire into the ecosystem by implementing management ignited prescribed fire in two separate areas totaling 3,996 acres. This treatment would reduce fuel loads to historic levels reducing wildfire risk. High fuel loads increase fire intensity which can damage soil structure and reduce productivity. Use of prescribed fire would also encourage species diversity in the SERP area. Alternative A would harvest 2,582 acres, 897 acres of aspen would be regenerated, 2,792 acres would be burned. Alternative B would harvest the same acres as the Proposed Action as well as a 10 year regeneration. Only 1,053 acres would be burned. Defensible fire suppression zones treatments would be the same for all Action Alternatives. A Proposed Forest Plan Amendment is also included.

To save on printing costs, this Final Environmental Impact Statement (FEIS) was reprinted without Appendices 3 (Forest Plan Standard and Guidelines) and 5 (Soil and Water Conservation Practices). Please refer to the DEIS for copies of these Appendices. In addition, only the pages where changes were made were reprinted and included in the FEIS. On the pages where changes were not made to the DEIS, the subtitle at the bottom of the pages still reads "DEIS."
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CHAPTER ONE

PURPOSE OF AND NEED FOR ACTION

This chapter outlines the Proposed Action, and the Purpose and Need that drove its development. It also discusses the relationship of this document to the Dixie National Forest Land Resource Management Plan (Forest Plan, 1986) along with other laws and regulations.

PROJECT AREA

The Spruce Ecosystem Recovery Project (SERP) area is located within the Dixie National Forest, Cedar City Ranger District. It is approximately 20 air miles east of Cedar City, Utah, and is immediately adjacent to Cedar Breaks National Monument, Utah.

The 52,991 acre project area is located in the upper drainages of the Parowan, Mammoth, Parachute, Asian and Coal Creek watersheds. Elevations range from 7900 feet at the north end of the project area to 11,307 feet at Brian Head Peak. The forest type is a primarily Engelmann spruce/subalpine fir, with a strong component of aspen. The forested areas are interspersed with meadows, basalt flows, and cinder cones. There are 37,577 acres of forest and 15,414 acres of non-forested land, and 22,951 acres of suitable forest land. There are 4,621 acres of unsuitable land based on adequate resources cannot be adequately assured and irreversible resource damage to soil or watershed conditions, and 372 acres unclassified. Suitable lands are areas where management practices are appropriate. Refer to the Forest Land Suitability Map in Appendix A for locations and the display of unsuitable areas.

State Highways 14, 143 and 148 traverse the project area. Brian Head Town is adjacent to the project area on the north boundary. Legal description for the project area include all or part of sections 29, 32, 33 of Township T1 S, Range R18 W, 6, 17, 20, 24, 25, 35 of T25S, R12W, 3-10, 15-21, 30-32 of T25S, R12W, 1, 12, 13-24, 25-36 of T25S, R12W, 10-16, 22-27, 35 and 36 of T25S, R12W, Salt Lake City, (SLC) Merriman, Iron County, Utah, and sections 1 and 2 T25S, R12W, 5-6 and T36S, R12W, SLC, Merrill, Kane Co., UT

PROPOSED ACTIONS

Several actions are proposed within the project area to progress toward desired conditions. These activities include commercial timber harvest, aspen regeneration, defensible fire suppression areas, and management prescribed fire. The actions are proposed to occur within a total of nine Focus Areas located in the northern portion of the SERP area. Five are associated with commercial timber harvest and aspen regeneration, one with only aspen regeneration, two with management prescribed fire, and one with defensible fire suppression areas. A detailed description of the proposed activities is contained in Chapter Two.

In addition to implementing proposed management actions, one amendment to the Forest Plan is proposed that reflects needed Forest Plan direction changes for future projects. The amendment is described in detail later in this chapter.

Activities proposed within the project area contribute to meeting the goals and objectives, management direction, and standards and guidelines found in the Forest Plan. The proposed activities are specifically designed to move existing conditions toward the desired future condition. This would occur for each resource area identified during preliminary analyses.

A watershed assessment was completed to describe existing conditions and determine the desired condition of the resource within the project area. The assessment area consisted of approximately 427,000 acres of National Forest

System watersheds encompassing private, state, National Forest and other federal ownerships. The assessment helped to determine the cumulative effects of the existing condition that showed a decline in forest health. Management activities proposed within the project area were then developed to address this condition. The assessment is included in the Project File (Exhibit 36) for the SERP analysis and is available upon request for review. In the analysis, although all desired resource conditions were identified and used to develop proposed activities, the following were key:

1. Maintain forest conditions which include; number of trees on a site (stock), structural size and age class distribution, species composition and diversity, and patterns (size, shape, location) to meet a variety of resource needs identified within the proposed project area. Meeting the desired forest conditions will reduce the risk associated with catastrophic losses due to insect, disease or wildfire.

2. Maintain sufficient numbers of standing snags and downed logs of various size class and species. This will provide important habitat for a diverse plant and animal community within the project area. Maintenance of this forest structure will also ensure a sufficient quantity of organic matter for the soil resource.

3. Maintain a strong representation of intact forest soils, emphasizing organic surface layers important to maintaining overall site productivity.

4. Maintain road conditions and locations to assure resource protection of soil and water resources. Minimize motorized open road densities to meet resource objectives; this should be less than two miles of road per square mile area.

5. Establish areas where fire suppression forces would have an added opportunity to suppress wildfire. These areas would contain less than ten tons of fuel per acre and have non-continuous ladder fuels. These would be established in strategic locations, where fire suppression personnel would have the best probability of controlling wildfire.

6. Where safety and resource objectives allow, reintroduce fire in sites where fuel characteristics are not within desired conditions. Through the use of prescribed fire, manipulate fire severity by introducing fire at specific times of the year. Fuels would be reduced to desired levels.

Detailed documentation of all resource considerations from the watershed assessment is located in the Project File (Exhibit 4.1)

ACTIVITIES PROPOSED

1. Treatments in conifer forests, including commercial tree harvest, forest regeneration activities, fuelwood removal or burning and road construction/ reconstruction required to support commercial harvest treatments.

BACKGROUND

The spruce fir forest on the Northern Markagunt Plateau (SERP area) is typically replanted every 250-400 years by an insect epidemic, wildfire, or a combination of the two. These replacement events generally occurred once the forest reached maturity. The old growth characteristics of the spruce fir forest, its susceptibility to catastrophic changes in the landscape, as a result of insect or fire disturbance regimes. However, small fires in primarily aspen areas and pocket losses of trees to bark beetles occasionally contributed to some size class differences and species mosaic across the forested landscape. Breaking up the continuity of mature forests can reduce large scale landscape changes as a result of fire and/or insect events. Small disturbances break up the continuity of heavy fuels and create stand conditions which are more attractive to bark beetles. Lack of a mosaic in the spruce forest structure of the project area has led to outbreak populations of spruce beetle. Large scale, overstory losses of the spruce component have occurred within portions of the project area since the early 1990’s. This event, although not desired from the perspective of objectives (fuels, visuals), is a natural, cyclic occurrence in the forests.

Healthy, vigorous spruce trees are capable of resisting attack by a limited number of beetles associated with endemic populations. Endemic populations of bark beetles cause mortality of individual hosts or small isolated groups of trees.
Populations at this level are generally controlled by host resistance to attack, parasites and predators. Pocket mortality contributes to star, and species diversity which reduces insect and fire susceptibility caused by a single event. Currently, pine beetle populations have killed thousands of pine trees, over approximately 940 acres on the Cedar City Ranger District. In some areas where spruce was th dominant overstory, few live trees remain. Because of expanding pine beetle populations since the early 1990's, an additional 15,000 acres of spruce forest are at risk to beetle infestation. Table 1-1 shows the Focus Areas and acreage proposed for treatment.

Table 1-1: Focus Area Acreage by Treatment

<table>
<thead>
<tr>
<th>FOCUS AREAS</th>
<th>ACRES CONIFER TREATMENT</th>
<th>ACRES ASPEN TREATMENT</th>
<th>ACRES DFS ZONES</th>
<th>TOTAL ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hancock Peak</td>
<td>1661 harvest</td>
<td>106</td>
<td>1737</td>
<td></td>
</tr>
<tr>
<td>Lower Deer</td>
<td>988 harvest</td>
<td>240</td>
<td>1283</td>
<td></td>
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<tr>
<td>Spruces</td>
<td>251 harvest</td>
<td>143</td>
<td>394</td>
<td></td>
</tr>
<tr>
<td>Steam Engine</td>
<td>258 harvest</td>
<td>258</td>
<td>516</td>
<td></td>
</tr>
<tr>
<td>Bunker</td>
<td>257 harvest</td>
<td>237</td>
<td>494</td>
<td></td>
</tr>
<tr>
<td>Deer Creek</td>
<td>534</td>
<td></td>
<td>534</td>
<td></td>
</tr>
<tr>
<td>Roadless Area</td>
<td>2225</td>
<td>587</td>
<td>4272</td>
<td></td>
</tr>
<tr>
<td>Chicken Head</td>
<td>159 harvest, 248 maps</td>
<td>364</td>
<td>1103</td>
<td></td>
</tr>
<tr>
<td>DFS Forest</td>
<td>41</td>
<td></td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5661</td>
<td>1934</td>
<td>7821</td>
<td></td>
</tr>
</tbody>
</table>

2. Aspen forest treatments - aspen forest regeneration as a result of commercial tree harvest, fuelwood removal, and prescribed fire.

BACKGROUND
Aspen forests add to structural and species diversity within the SERP area. This diversity increases wildlife value because it provides a cover type much different than conifers. Aspen also provides recreation and scenic values as a result of full coloration. In the proposed project area, more aspen is currently being lost than replaced by aspen regeneration. The spruce/subalpine for forest type is replacing the aspen.

Aspen forests are fire or disturbance dependent. They require frequent disturbances, like fire, to ensure the most competitive and least fire adapted conifers do not replace aspen clones. Conifer invasion on aspen sites slows aspen regeneration, thus eventually replacing the aspen component. The increase in conifers also creates higher fuel loads and ladder fuels which can cause home fires. An increase in ladder fuels also causes fire to spread more rapidly as it carries fire from one crown to another. These changes in fuel structure increase the risk of additional resource damage. Aspen regeneration treatments are proposed to occur in six Focus Areas as shown on Table 1-1.

3. Establish defensible fire suppression (DFS) zones on national forest system lands along corridor and in sites adjacent to other land ownerships (private land, national monuments, etc.). These sites generally have higher resource values in addition to a higher incidence of human caused fire risk. Travel corridors are identified as existing DFS zones. With minimal costs for improvements, these corridors can provide suitable fire breaks for suppression of wildfire.

BACKGROUND
Fuel loads have increased within the aspen/subalpine component to a level of risk where resource and property loss would be significant if wildfire occurred. Creating DFS zones adjacent to high value urban interface areas and along primary travel routes would reduce potential catastrophic loss of property or resources.

These activities are proposed to occur in the DFS zone Focus Area and contains 41 acres.

4. Reintroduce fire in areas where fire's influence has been reduced from it's historical role. Through prescribed burns, fuels can be safely reduced to historical levels. Severity of burns will be reduced by reintroducing fire at specific times of year.

BACKGROUND
Ecosystem health could be significantly altered with the exclusion of fire. Allowing wildfire to ignite and burn naturally where fuel levels are high and difficult to control, could result in the loss of valuable resources, property or even human lives. Introducing prescribed fire by trained fire behavior specialists allows management of a valuable resource tool.

In addition to the aspen regeneration treatments previously described where fire could be used in conjunction with commercial or fuelwood removal, this activity is proposed in the Chicken Head (1103 acres) and Roadless Area Focus Areas (2792 acres). Species composition in these Focus Areas include aspen, conifer and aspen labeled non-forested vegetation.

PURPOSE AND NEED FOR THIS PROJECT

THE PURPOSE OF THE PROPOSED ACTIONS

1. The purpose of actions within the contiguous forests in the project area to improve forest health and ecosystem function by improving species diversity and forest structure and pattern characteristics. The proposed treatments will recover valuable wood products, reduce fuel loads to desired conditions, and allow for a more rapid rate of reforestation.

2. The purpose of proposed actions in the aspen component is to:
   A. Increase species diversity across the landscape to reduce catastrophic losses associated with forest fires. Currently, the abundance of spruce in a structural stage susceptible to spruce beetle, has resulted in a large loss of the overstory component in infested areas. The spruce beetle primary host is spruce and has little effect on non-host species such as aspen or fir. Increasing the non-host component and varying structural size classes will reduce large landscape impacts in the long term. Maintaining a diverse forest structure and increasing diversity will reduce forest susceptibility to catastrophic events (Schmidt and Frye 1976).
   B. Improve the visual form, color and textural diversity in the landscape viewed by forest users. Aspen fall coloration is the primary factor that contributes to the term "color country" used to describe this area. The loss of aspen across the landscape would reduce the visual impact and recreational enjoyment associated with this species.
   C. Improve structural-vegetative diversity associated with wildlife habitat. Aspen forests are important habitat for many species of birds and mammals, especially in the interior west where it is the only upland hardwood species. Aspen ecosystems provide forage production for wildlife in fire-dominated environments. In grassland settings, aspen is used as hiding and thermal cover.

3. Some high value resource areas on the Cedar City Ranger District have high fuel loads in or adjacent to them. The purpose of the establishment of Defensible Fire Suppression zones is to improve wildfire suppression capability in these areas. Fire suppression zones provide fire fighters with an area to stop or slow the spread of wildfire.

4. Previous fire suppression tactics have created changes in vegetation and forest structure. Reintroducing fire in the landscape will accomplish three objectives.
A. It will reduce fuel loads to historic levels reducing wildfire risk.

B. High fuel loads increase fire intensity. High fire intensities can damage soil structure, remove valuable soil macro and micro invertebrates and could significantly effect natural regeneration.

C. Encourage diversity across the vegetative landscape

Prescribed fire is an important management tool when used under controlled conditions. Implemented correctly, it can result in landscapes that meet resource objectives and prevent uncontrollable wildfire conditions from developing.

**BASED ON DESCRIBED PURPOSE AND DESIRED FUTURE CONDITION, THE FOLLOWING NEEDS HAVE BEEN IDENTIFIED**

**TIMBER HARVEST**

- Salvage dead and infected conifer trees. Commercial harvest of spruce beetle caused tree mortality will allow for the recovery of wood fiber. Removing dead spruce will also reduce forest fuels as standing trees eventually fall to the forest floor. Reducing fuel loads will create conditions favorable for establishing natural and artificial regeneration.

- Remove additional trees to alter forest stocking, species mix and structural attributes. This treatment will be done to reduce residual spruce susceptibility to spruce beetle attack. Reducing inherent risk to spruce beetle is an attempt to maintain some of the large spruce component. These large overstory trees are important for many resource objectives including, wildlife, recreation, visual and natural regeneration.

**ASPEN TREATMENTS**

- Create a mosaic pattern of aspen throughout the project area to increase younger age class representation. Treatments will involve new stands of aspen are developing to replace older stand structures as they die. This will enhance the opportunity to sustain aspen for, six over the long term in a properly functioning condition.

**DEFENSIBLE FIRE SUPPRESSION ZONES**

- High fuel loads in and adjacent to valuable resources require the development of Defensible Fire Suppression Zones on the Cedar City Ranger District. These DFS zones provide the best opportunity to suppress a wildfire that may occur and threaten existing resources.

**PRESCRIBED FIRE**

- Long-term fire suppression tactics have created change in pattern and distribution of vegetation. Implementing prescribed fire creates diversity in vegetation pattern, composition and structure. The creation of fuel breaks reduces the threat of catastrophic wildfire events.

**PUBLIC INVOLVEMENT**

Forest health issues have increased as a result of current bark beetle activity on the Cedar City Ranger District. Large scale changes in forest structure may prevent resource management goals from being attained or meeting public use objectives. Resource goals, which involve social values, associated with desired future condition may be adversely affected as a result of these changes.

Since 1992, the Dixie National Forest has provided information and responded to questions from thousands of people regarding bark beetle biology and the effect epidemic populations have on forest resources. This information was used to implement prescribed fire treatments to control bark beetle populations on the forest.

**FOREST PLAN DIRECTION**

The 1996 Forest Plan places 44 percent (12,929 acres) of the Spruce Ecosystem Recovery Project area within the General Forest Management Area (11, three percent (1,173 acres) in the Winter Sports Sites Management Area (11B, 19 percent (9,409 acres) in the Semi-Primitive Recreation Area (2A), 10 percent (5,585 acres) in the Roped and Roaded Recreation Area (2A), 19 percent (1,173 acres) in the Lookout Grazing Management Area (3A), 12 percent (6,360) in the Timber Management Area (3A), one percent (1,403) in the Riparian Management Area (3A), less than one percent (239 acres) in Developed Recreation (1A), Fish and Aquatic Habitat (1A), Wildlife Habitat (1A), Municipal Water Supply, Watersheds (1B) Management Areas, and nine percent (3,474) within private lands. The Forest Plan Direction section of this chapter describes the goals and desired future condition for the primary management areas.


The Forest wide wide scale guidelines and standards (S&G's) describe measures to be applied all 5,190,700 acres on the Dixie National Forest unless superseded by specific management area S&G’s. Implementation of the Forest wide and specific management area S&G’s would move the project area towards the "Desired Future Condition (1984) described in the Forest Plan".
MA 1 - GENERAL FOREST DIRECTION

This plan direction is comprised of major areas across the forest not covered by other MA's. Resource values across this high area vary depending on adjacent resource uses.

DESIRED FUTURE CONDITION

The area emphasizes recreation. Depending on the ROS classification, certain DFC values would be emphasized. For a detailed discussion of this refer to Chapters Three and Four, Recreation and Scenery Management sections.

MA 23 - SEMI-PRIMITIVE RECREATION

This management area occurs in the central portion of the project area and contains the roadless inventoried area. It covers approximately 9,309 acres of which 6,824 are in the Hancock Peak Roadless Area (Forest Plan, pp IV-63 to IV-67).

DESIRED FUTURE CONDITION

This area will provide the user with a moderate to high probability of experiencing a feeling of isolation, tranquility and self reliance in an environment offering challenges and risk. This DFC will offer the outdoor recreationist a high degree of nature in a natural environment.

MA 2B - RURAL & ROADED RECREATION OPPORTUNITIES

This management area consists of travel corridors along major traveled routes, some of which lead to various recreational attractions on the Forest. Principle state highway corridors include SR 14, SR 148, and SR 143. (Forest Plan, pp IV-68 to IV-72).

DESIRED FUTURE CONDITION

This area is characterized by a modified natural environment. Resource modification and utilization practices are generally in harmony with the rural environment. Some of the more modified areas within this area, utilization practices enhance recreation activities, maintain vegetative cover, and soil production. The opportunity to have a high degree of interaction with the natural environment and to face challenges associated with more primitive forms of recreation would not be important. Both motorized and non-motorized forms of recreation are possible in this area. The natural features of the landscape would dominate.

MA 6A - LIVESTOCK GRAZING

This management area consists of mountain meadows and parks with sage grass or grass forb vegetation (Forest Plan, pp IV-109 to IV-113).

DESIRED FUTURE CONDITION

Acceptance of areas receiving this emphasis will remain essentially the same. Production and range condition will be improved. Areas where vegetation manipulation practices have been accomplished will be maintained for optimum forage production. Numbers of livestock improvements water developments, fencing will increase.

MA 7A - WOOD PRODUCTION AND UTILIZATION

This management area consists of the major forested areas on the Forest. At lower elevations ponderosa pine is dominant. Mixed conifer species occupy mid elevation while the spruce for type is dominant at the highest elevation (Forest Plan, pp IV-114 to IV-120).

DESIRED FUTURE CONDITION

This management area contains most of the commercial timber on the Forest and is the most highly productive for growing timber. The basic long-range objectives of timber management for this area are:

1. Create and maintain nearly equal areas in seedlings and saplings, pole timber, immature sawtimber and mature sawtimber.
2. Create and maintain stand conditions that will minimize growth loss and mortality from insect and disease.
3. Convert slow growing stands of mature sawtimber (beyond culmination of mean annual increment for the product size objectives) to young, thriving stands of desirable species.

PROPOSED FOREST PLAN AMENDMENT

A Forest Plan Amendment is also proposed. This amendment is proposed for the purpose of clarifying "Opening Size", public review, and Regional Forester approval when responding to catastrophic events such as windstorms, fire, disease and insect epidemics. In catastrophic events, such as those previously mentioned, No opening size limitations will apply. However, the effects of this change in management direction and in the Forest Plan Standards and Guides will be detailed each time these new standards are applied.

A detailed description of the need for change to the Forest Plan is located in Chapter Eight. Proposed Forest Plan Amendment

DECISIONS TO BE MADE

This document will provide the Forest Supervisor of the Dixie National Forest with the basis on which to make an informed decision. Following a review of this document, the Forest Supervisor will decide to do one of the following:

1. Approve the recovery activities within the Spruce Ecosystem Recovery project area as presented in the Proposed Actions, or one of the action alternatives to the Proposed Actions, or a combination of alternatives in this document. This also includes approved mitigation measures designed to reduce resource impacts associated with implementing an activity. Multiple decisions may result from this analysis.
2. Refuse the No Action alternative, indefinitely unless another analysis is completed.
3. Approve or not approve the Forest Plan Amendment.
Figure: 1

Dixie National Forest
Cedar City Ranger District
Spruce Ecosystem Recovery Project

Legend
- Spruce Ecosystem Recovery Project
- Private Land

[Map of the area with labeled locations and roads]
CHAPTER TWO

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

CHAPTER TWO

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes the Proposed Action and alternatives to the Proposed Action which were designed to respond to key issues while still addressing the Purpose and Need identified in Chapter One. As required by law, a "No Action Alternative", consisting with existing conditions and action not to be considered. A summary of the comparison of each alternative is included at the end of this chapter.

ISSUES

During the initial phase of planning for the Spruce Ecosystem Recovery Project (SERP), the Interdisciplinary Team (IDT) developed a preliminary list of issues. These issues were directly related to the proposed actions, including:

- timber harvest and associated road construction closures.
- aspect regeneration, prescribed fire, and defensible fire suppression zones.
- and the effect of these activities on the natural resources and local economy of the area.

Information and concerns from the public involvement process, from resource specialists in the USDA Forest Service, and from other public agencies were used to finalize significant issues. The Interdisciplinary Team evaluated the initial public and agency information and confirmed three significant issues that would drive the development and evaluation of alternatives. The Issue Analysis is contained in the Project File (Exhibit 9) and is available upon request.

SIGNIFICANT ISSUES THAT DRIVE ALTERNATIVE DEVELOPMENT

ISSUE ONE

Proposed road construction and closures. Two opposing access management concerns are included in this issue. First, there is concern that increased access will adversely affect recreational values, ecological integrity, wildlife, and increase erosion. The second is a concern that closing roads will restrict public access and reduce primitive motorized recreation opportunities.

DISCUSSION

1 to 5 miles of new roads are proposed for construction that will be closed upon completion of the project activities. About three miles of existing, current open roads are proposed for closure in the Bunker Creek drainage and five miles in the Hanock Peak area. The roads in Hanock Peak will be closed as directed under the Hanock Peak E.I.S. The road closure plan specifies that the roads will be closed to all mechanical and motorized travel by installing natural barriers such as rocks, earth berms, or closures some of the roads in Hanock Peak were scheduled to occur in 1997, but will now be delayed until the completion of the proposed activities.

The effects of construction upgrading and closing roads will be analyzed by all affected resources in Chapter Four. All existing roads proposed for use to transport logs in the Focus Areas are designed to accommodate travel by most vehicular traffic. The NO ACTION alternative will discuss the effects of not constructing or closing roads.

COMPARISON CRITERIA FOR ISSUE ONE

- 11 Miles of open roads per square mile per year.
- 1 mile of constructed roads, where road prism remains intact (where roads are not obliterated).
- 31 miles of temporary road and time period prior to obliteration.

ISSUE TWO

Proposed activities and the recreation resource related economic effects to American Head Town. There is concern that the activities will reduce scenic quality, air quality, public safety, and recreational quality. This potentially reduces visitation and associated income to recreation and tourism dependent businesses. This includes loss of opportunity for semi-primitive recreation in areas with undeveloped character. Concern has
ALTERNATIVES

ALTERNATIVES CONSIDERED IN DETAIL

1. ALTERNATIVE 1: Proposed Action

The Proposed Action is to construct an emission control system at the existing facility.

2. ALTERNATIVE 2: No Action

The No Action alternative is to do nothing and continue with the current operation of the facility.

3. ALTERNATIVE 3: Mitigation Measures

The Mitigation Measures alternative includes construction of an emission control system and implementation of operational changes.

4. ALTERNATIVE 4: Revised Proposed Action

The Revised Proposed Action alternative includes construction of an emission control system and implementation of additional operational changes.

5. ALTERNATIVE 5: Other

Other alternatives include the potential for constructing a new facility or discontinuing operation.

ALTERNATIVES AFFECTED BY THE PROPOSED ACTION

The Proposed Action is likely to affect the following alternatives:

- Alternative 1: Proposed Action
- Alternative 2: No Action
- Alternative 3: Mitigation Measures
- Alternative 4: Revised Proposed Action
- Alternative 5: Other
FEATURES COMMON TO ALL ACTION ALTERNATIVES

The action alternatives evaluated in this FEIS conform to the direction provided by the Forest Plan. All applicable standards and guidelines described in the Forest Plan are implemented as part of this project. Forest Plan standards and guidelines (S&G's) for Management Area 1, 2A, 2B, 6A, 7A, and 8A, identified in Appendix 3, will become part of all action alternatives. The applicable portions of the Forest Plan S&G's are highlighted below in addition to other design criteria and mitigation measures incorporated by the IDT to avoid undesirable resource effects.

DESIGN CRITERIA AND MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES:

Related to Soil and Water:

1. Site-specific soil and water conservation practices (SWCPS) for this project are described in the Project File (Exhibit 15a). Soil and Hydrology Reports. SWCPs 11.5-14, 13.1-13 and 14.3-22 apply to vegetation suppression and timber harvest activities.

2. To reduce soil compaction, displacement and puddling by logging equipment. Contract C provisions would be utilized which require end-timing to designated skid trails. The desired future condition is to protect long term soil productivity and soil hydrologic function on at least 85% of the activity area (Soil and Hydrology Reports. Project File 6. Exhibit 15a, Appendix 5. FSH 2509-22).

3. To meet long term soil productivity objectives, a minimum of 10-15 tons of down woody material greater than 5 inches in diameter, at the small end, would be retained (Harvey et al. 1989, 1994, Soils Report. Project File 6. Exhibit 14a). Retain 5-10 tons per acre in the DFS zones. Refer to Fuels Mitigation Measure number 29 for process objectives.

4. Minimize use of prescribed fire on sensitive sed(s) within unit 239.

5. Riparian areas will be given special management consideration to protect water quality, channel morphology, terrestial wildlife habitat, and aquatic habitat. During the implementation phase of the project an ID Team will provide site-specific prescriptions designed to protect the above attributes. Where field reviews and site-specific prescriptions are not completed, the following guidelines will be implemented:
   a. Perennial, fish-bearing streams: No harvest, ground disturbance, or burning within 200 feet from the edge of riparian vegetation.
   b. Perennial, non-fish-bearing streams: No harvest, ground disturbance, or burning within 100 feet from the edge of riparian vegetation.
   c. Intermittent and ephemeral channels: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or channel.
   d. Ponds, lakes, seeps, and wetlands: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or seasonally saturated soil. These guidelines are designed to provide optimum protection of water quality, channel morphology, and riparian and aquatic habitat in the absence of field reviews.

Related to Vegetation:

6. Residual tree damage in dense stands of live spruce would be minimized by including contract B and C provisions requiring:

   a. valued trees designated as leave trees or reserve trees during sale preparation, be protected during harvest;
   b. damage to any residual trees (undesignated) be minimized during any harvest activity (felling, skidding, etc.);
   c. use of designated skid trails and endtime to these trails;
   d. use of designated or and constructed landings;
   e. piece length restrictions during skidding.

7. To reduce risk of spruce borer spread and re-infestation in the Hancock Peak Focus Area:

   a. All live green Engelmann spruce trees or pieces >14 inches in diameter and 18 inches in length, felled or pushed over would be removed to designated landings disposal sites. This would be done prior to moving any skidding equipment out of the area, and before seasonal closure. All spruce, deposited at landings, would be removed or burned prior to the next flight period. Applicable contract C provisions would be used to meet this mitigation. (Alexander 1987; Schmidt 1976).

8. To protect aspen regeneration or investments in areas that are artificially planted from livestock damage, more intensive herding practices would be required. Sheep grazing will be deferred for 3-5 years. In some areas, it may be necessary to defer grazing for a season prior to burning to allow fuels to increase. If burning does not meet objectives, then planting fencing would be put in place for up to 10 years following the planting or regeneration treatments (Brown and Zimmerman 1986). Areas to be planted, at least in part, are all plantable conifer areas that are designated as a created opening with less than 21% crown closure on the maps included in Appendix 7 for action alternatives.

Related to Wildlife:

9. Report and record any sightings of threatened, endangered, and sensitive species and implement appropriate protection measures as stated in recovery plans. Forest Plan S&G's or other approval plans where appropriate. Contract C provisions would be included in commercial contracts to assure enforcement.

10. Project area must be surveyed for goshawks nest sites following accepted current protocol. Contract C provisions would be included to assure appropriate actions can be taken during the commercial operations where necessary as determined by the zone wildlife biologist.

11. Where possible, hiding cover should be retained (where it exists on 50% or more of the perimeter of all natural and created openings, along at least 75% of the edge of arterial and collector roads and at least 50% along streams and rivers (Forest Plan 4.V.35).

12. Woody debris will be left on site at 10-15 tons per acre except in DFS zones and in the immediate foreground for scenic resources. The woody debris will include a minimum of five pieces of large woody debris, so maintain small mammal populations for goshawks and other raptor prey and soil nutrient cycling, where available. Pieces would be a minimum of 12 inches at large end and ten feet long (Forest Plan 4.5. A00-4.B; Harvey et al. 1987; McCaughey et al. 1991, Alexander 1987, Reynolds et al. 1992).

13. Assure that a minimum average of three snags (greater than 18" DBH and 30 feet tall) will remain singly or in clumps relatively evenly distributed over the landscape after all activities have been completed and maintained in the short term. Leaving more than the average three per acre will help ensure that the desired amount is reached at the completion of the project. Six per acre are recommended. Leaving of clumps of snags as "no cut" areas in locations away from potential wood cutters is recommended so as to prolong snag longevity.
A rule of thumb or guideline for leaving clumps of snags is to leave a one acre no cut area for every 20 acres of cut area. (This amount has been used in salvage lodgepole pine areas in the Pacific Northwest Region.)

Priority for selection of clumps should be: Around squirrel middens. Where no more than 50 percent of each tree species exists. Where there are no currently infested trees.

14 Where possible, no harvest corridors at least 300 feet wide are recommended in order to provide connectivity between forest blocks (Payne et al. 1994). Leaving corridors of no harvest or very light harvest along perennial streams is also important for forest breeding birds as well as travel corridors for Mexican spotted owl, deer, elk, amphibians and other wildlife species (Dureau et al. 1993). Although these recommendations were designed with a green forest situation, dead trees would provide connectivity in the short term until the dead trees fall. Therefore, leaving the connectivity corridors in the same locations as riparian areas would provide both habitat for wildlife species and protect riparian values. Locations and widths of these corridors will be determined by an IDT and approved by the deciding officer.

15 To provide habitat to support northern goshawks, the best scientific information available, including Management Recommendations for the Northern Goshawk in the Southwestern United States (Reynolds et al. 1992) has been used to design treatments in Nest Areas and timing of treatments in goshawk Nest Areas and PFA’s. The goals of treatments are to maintain or enhance existing Nest Areas, and to avoid potential disturbance in Nest Areas and PFA’s so as to maintain or enhance goshawk populations. Treatments in the PFA’s and Foraging Areas have not been designed to maintain optimum structure for goshawk habitat because of the sparse mortality conditions.

To avoid potential disturbance to nesting goshawks, activities will be evaluated on a case by case basis using a process that considers such items as: the number management activities proposed during the breeding season; the nature of the activity, the distance of the activity from the Nest Area, and the topography between the nest area and the activity or activities. See Project File for more information.

16 Harvest treatments in goshawk nest stands comprise of live trees will only be thin from below to maintain or enhance large diameter trees. The nest tree shall not be harvested. Harvest in dead Nest Areas will not be allowed unless activities to enhance Nest Area attributes, as determined by a Journey Level Wildlife Biologist and Silviculturist.

17 To minimize or eliminate impacts of timber harvests upstream from Arizona wolverine populations, establish a minimum of a 100 foot buffer on each side of the riparian area (Arizona Wolverine Interagency Technical Team 1994).

18 Establish management zones surrounding each documented nesting raptor species with acreage shown on T-2-1. 2.5 mile by 2.5 mile management zone specific prescriptions to maintain or improve habitat will be established, and timing restrictions for timber sale layout, road construction or reconstruction, timber harvest and associated activities and prescribed fire will be employed to avoid disturbance to nesting. Species included on this table will be evaluated on a case-by-case situation. Northern goshawks are addressed separately above.

Table 2-1. Raptor management areas.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>MANAGEMENT ZONE</th>
<th>NEST AREAS</th>
<th>NESTING SEASON</th>
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<tbody>
<tr>
<td>Cooper’s Hawk</td>
<td>2500</td>
<td>15</td>
<td>May 1 - Aug. 15</td>
</tr>
<tr>
<td>Sharp-shinned Hawk</td>
<td>1263</td>
<td>10</td>
<td>June 20 - Aug. 15</td>
</tr>
<tr>
<td>Flammandered Owls</td>
<td>69</td>
<td>25-40</td>
<td>May 15 - Sept. 30</td>
</tr>
</tbody>
</table>

18. Where identified by a journey level wildlife biologist, no activities that would potentially disturb calving areas will be allowed during May 1 through July 1 in the Deer Creek and Bunker Focus Areas.

20. Maintain turkey and blue grouse roosting areas, and deer and elk bedding areas, ranging from 1.2 to 10 acres, by retaining one or more groups of 15 to 20 trees within the roosting bedding area. These trees should be a minimum of 16 inches dbh. Ninety percent of the perimeter around bedding areas would be retained to hide 90% of a deer or elk at a viewing distance of 200 feet.

Related to Recreation and Visuals

21. To meet Visual Quality Objectives (VQO’s) of Retention within the immediate foreground areas up to 300 feet of either side of the road or trail adjacent to Highway 143, the Dark Hollow, South, and the Hancock Peak Trails; and the Sidney Valley (6048), Long Flat (537”), and Red Desert (6226) Roads; and McLeod Lake Subdivision, slash treatments applied to approximately 16 acres would be as follows:

a. Stumps would be cut to a 6 inch height throughout the foreground area on the uphill side. Where stump diameter prohibits cutting within 6 inches, height will be as close to ground as possible; to exceed 12”. Within the immediate foreground areas up to 300 ft of trails, the face cut of stumps would be directed away from the trail, where possible.

b. Approximately 70% or more of the activity-generated slash smaller than three inches in diameter within the immediate foreground would be hand-piled and burned, to meet visual quality objectives. Machine piling may be used if determined visually acceptable by the Zone landscape architects and Forest soil scientist. Piles would be placed in areas that provide natural screening in the immediate foreground such as behind rocks, dense vegetation and other topographic features.

c. Slash piling within the immediate foreground would occur during operations or by the end of the second operating season following the completion of harvest operations. The exception to this would be if harvest operations are completed during the winter period; in this situation slash clearance would occur by July 1 of the following year, weather permitting, and piles burned during the first available burning window the same year (typically September and October).

d. Piles created in the immediate foreground would be burned to achieve 95% or more consumption. Following burning, concentrations of unconsumed slash would be scattered and the ground would be seeded with the approved seed mixture for this area. The burning of piles created within the immediate foreground between June and September of any year may be burned in September-November of that year unless fuel or weather conditions are not conducive for attaining the 95% consumption objective. If this occurs, slash piles would be burned the following spring as soon as weather conditions permit. Slash piles created during a winter harvest operation should be burned by the following September-October period.

e. The majority of material larger than three inches in diameter (small end) within the immediate foreground would be scattered over the site to meet long-term soil productivity and provide site prep for stand regeneration.

f. Slash piling and burning for areas other than what is described above, would be the same as under standard fuel reduction mitigation described below.

Spruce Ecosystem Recovery Project FEIS 2-6
22. Slash disposal requirements along the portion of the constructed road to the Spruces Focus Area, where the existing trail (1.3 miles) will be rerouted will include burying the stumps and scattering of the slash. Slash disposal requirements on the remaining portion of the Spruces road with include placing the stumps along the toe of fill slope and scattering of the remaining slash.

23. Interpretive signs and other information media would be developed to inform visitors of the implications of the spruce beetle epidemic and the proposed management activities.

24. A no treatment area adjacent to the Dark Hollow Trail in the Steam Engine Focus Area will be designated prior to implementation (up to 300 ft. depending on windthrow risk and scenic management objectives).

Related to Public Safety

25. To provide reasonable assurances for public safety during harvest operations recreation trails would be closed. During logging, sawing, hauling, and burning activities. Progression of treatments would occur in a manner to ensure there are always facilities open to accommodate desired uses: the primary concern here is relative to recreation trails (hiking, mountain biking, etc.). Following is a list of trails and their approximate closing time frames in days: these closures could occur anytime during the normal operating period (June 15 through November 30). These closure periods may or may not be consecutive days. All trails in the SFRP area located adjacent to stands of dead trees will be signed to inform the public of possible hazards.

- Dark Hollow Trail: 4-8 days for Proposed Action and Alternative B.
- Hancock Peak Trail: 15 for Proposed Action and Alternative A, five for Alternative B.
- Spruces Trail: 15-30 days for Proposed Action and Alternatives B.

Related to Furb Management

26. In the timber harvest Focus Areas, slash cleanup would be completed to levels necessary to reduce impacts to scenic quality, risk of wildfire, and impairment to reforestation efforts. This would include load and scatter on-site slash, jackpot burning, sawing of cull logs to disposal sites, and pile burning of slash at common disposal sites. It is desirable to retain a minimum of 10 to 15 tons per acre of slash greater than three inches in diameter (inclusive of existing down woody material), uniformly distributed over the area to reseed with a herbicide. Nuisance activity and mosquitoes for reforestation. Piling and burning of slash, and burning may be completed by 90 days after the project.

27. Natural fuel breaks—topo meadows, rock faces, etc.—skis runs, skid trails and roads would be used to break up fuel continuity into 40 acre blocks, or less within the timber harvest Focus Areas (Forest Plan §§ and p. IV-54).

28. When prescribed burning is conducted in the Focus Areas, including pile burning, will follow FSM 5140 direction for prescribed fire. In addition, the following were identified as important within the scope of the SFRP project area:

- Local recreation activities will be monitored to minimize any adverse effects burning may cause.

30. Cultural resource sites known within this project area would be protected. If a site is located during operations, operations would cease until the site is evaluated by the Forest Archaeologist (or trained designee). Appropriate mitigation would be applied to assure site protection needs. This measure would be enforced through contract C. provisions during commercial harvest activities.

30. Special Use permit structures and developments (waterlines, powerlines, water tanks, spring developments, etc.) within the project area would be protected by inclusion of appropriate contract C clauses needed for protection, as well as their location shown on contract maps designated for protection.

Related to Transportation

31. Site specific soil and water conservation practices (SWCPs) for this project are described in Appendix 5. SWCPs 11.5-6 and 15.2-25 apply to road activity.

32. The newly constructed road system would be for administrative use and timber sale activities only. Closure of all newly constructed and temporary roads would be completed within 5 years of commercial operations. All temporary roads would be obliterated, reconstructed, and revegetated. All newly constructed systems roads (Spruces) would be temporarily closed. By signing and gating during project implementation, and permanently closed by narrowing the first 300 feet to a width that restricts vehicles that are wider than 36 inches. Two gates would be installed as part of the salvage road contract. Approved or KV funding would be used for the closure work and scheduled for the year closure is desired.

33. Road standards and surface of the main collectors is consistent over all alternatives reflect the Road Design Package in the Project File, exhibit 16).

34. All stumps removed during road construction would be disposed of by either scattering or burial. Clearing slash would be piled and burned at designated disposal sites or left unpiled and scattered.

35. Revegetation of disturbed areas would be accomplished by seeding with a certified, weed-free, native seed mixture to reduce the potential for introduction of noxious weeds. Seeding would be completed by the end of the first operating season following disturbance.

Related to Furb Routes

The following mitigation measures are necessary to provide for the safety of Forest users within the project area:

36. Precautionary log truck traffic signage ("Caution Log Trucks". "Trucks Entering Highway", etc.) shall be posted by the timber purchaser as designated by the Forest Service. Signs used shall meet Manual of Uniform Traffic Control Devices (MUTCD) standards.

37. No timber hauling is permitted on national holidays, or the opening day of rifle deer-season, unless approved in writing by the Forest Service.

38. The State of Utah may restrict hauling on U-143 during spring break-up when the highway road base has thawed but is too wet to support heavy loads (April 2 through May 30).

Spurce Ecosystem Recovery Project FEIS

- Prior to broadcast burning, those areas where 10-ton Properties exist will have potential for secondary impacts will need to be evaluated. Mitigation measures could include laying foam or retardant on the site or immediate revegetation. Revegetation work will need to be done by hand broadcasting or by using light rubber tipped vehicles such as "four wheelers".
39. The Forest Service shall erect interpretive signs to describe the need for timber hauling at location(s) mutually agreed upon with the Town of Brian Head. Other interpretative services, such as field tours, video presentations, pamphlets and formal presentations, may be coordinated with the Town of Brian Head.

There are two haul routes (east and west) possible on Utah State Highway 143 from the junction. The haul route to the east on Utah State Highway 143 is to the junction of Utah State Highway 143 and 148 is the designated haul route for appraisal purposes. The haul route to the west on Utah State Highway 143, through the town of Brian Head, to Parowan, to I-15. Which direction is used will be determined by who is the successful bidder on the timber sale contract. The Forest Service has no jurisdiction over the use of Utah State Highway 143. However, the successful bidder will be encouraged to use the appraised route to minimize conflict with use in the Brian Head Town area.

The following are requirements and or restrictions which the Forest Service. The Town of Brian Head, The National Park Service and or the State of Utah will apply to the use of Highway 143, under their respective jurisdictions.

Related to Haul Routes to the East

This route would transport haul south from the project area via the Highway 143 to the junction of U-148. Trucks would then continue on U-143, heading east to the junction with Highway 89, at Paraguch, Utah. From this point, some trucks may deposit logs at Paraguch, or continue to transport logs to other mill sites.

If a contractor requires railhead to reach mill destinations, the east route could be used to access railheads in Milford, Utah, through less direct that the route to the west out of the project area discussed below. If a contractor used this route to reach railheads in Milford they would transport logs north on Highway 89 out of Paraguch. Utah to the junction with Highway 20, head east on Highway 20 to the Junction with I-15, and turn north on I-15, exiting at the Beaver Millford, Utah exit.

Route to the East

40. Log truck traffic is relatively common on this route. Standard mitigation measures previously stated will provide necessary assurance for public safety; in addition:

- The National Park Service prohibits all log truck traffic (loaded or empty) on Cedar Breaks National Monument Road #148 from the junction of U-143 to U-14.

Related to Haul Route to the West

If the contractor elected to use rail transportation to transport logs to market, it is anticipated that they would need to haul logs to the Milford railhead for shipping to a processing mill. An alternative route to which Milford, more direct than going the eastern route, is at the junction of 148 trucks would proceed through the towns of Brian Head and Paraguch, Utah and continue on Interstate 15 to Exit 109 at Beaver. Trucks would then turn west out of this exit ramp at Beaver and travel 22 miles west to the railhead at Milford, Utah. At the railhead, trucks would deposit logs for future transport to a processing mill. If the successful bidder's processing mill was located in Cedar City, Utah, logging trucks would proceed south on Interstate 15 instead of north.

41. Due to the high recreational user traffic that originates out of Brian Head, Utah, mitigation measures are needed to maintain public safety during logging hauling that are in addition to the standard mitigation previously mentioned. The Forest Service does not have jurisdiction over log hauling on U-141 through the Town of Brian Head and Parowan, Utah. However, contacts with the Town of Brian Head and Parowan have indicated the need for the following mitigation, as set by the Town Council:

- a. The timber purchaser shall be prohibited from hauling through the Town of Brian Head and the Town of Parowan during the Brian Head Flash, the Brian Head River and the Iron County Fair by restricting use of Forest System roads accessing Highway 143 from landing locations within the project area.

b. Some restrictions shall apply for log truck traffic within the town limits. Engine brakes (jake brakes) are prohibited from use at all times in these areas.
treated area has been non-commercially thinned which included some treatment of the aspen component. In 1996, spruce beetles infested untreated stands. Portions of the treated area have higher tree densities favorable to spruce beetle. A few attacked trees were observed in these clumpy pockets of spruce. This site and the proposed treatment area. An average of 6% of the aspen were infested with spruce beetles, mostly in the outer borders of the aspen stands. In the untreated pocket spruces, densities in residual pockets of spruce. All infested host trees will also be removed in the demonstration area. Thinning of the larger stands will reduce stand risk to the low risk category. Silvicultural treatments where inter-tree spacing is consistent throughout the thinned unit, have reduced residual host mortality caused by other species of bark beetles. The proposed treatment will remove approximately 20-30 percent of all species, so intra tree spacing is maintained and target basal areas are reached. If this treatment proves to successfully reduce mortality of the overstory spruce component, similar treatments may be implemented in other sites where moderate-high risk stands of spruce are found. In addition to the demonstration area, infested stands immediately adjacent to this site would also be removed. Harvest activities would occur within the Hancock Peak Trail.

Forest service personnel from the Forest Health Protection and Research staffs will assist in establishing the demonstration area. Up to 1,641 of the original 2,250 acre Hancock Peak sale will be included in the demonstration study. New roads will be constructed and 11.7 miles of existing roads will be modified for maintenance or minor reconstruction. All existing roads associated with the original sale will be closed upon completion of the demonstration project; if not completed with approved funding. Following full funding of this activity area, any remaining funding would be allocated to projects identified at a later date (A detailed cost analysis is in the project files).

**DESCRIPTI0N OF ALTERNATIVES**

There are four alternatives described in detail in this FEIS. They are: (1) The Proposed Action - Sanitation Salvage Harvesting (using tractor logging systems); (2) No Action (treatment management); (3) Alternative A - The Proposed Action with no treatment of the Chicken Head and Spruce Focus Areas and sites 3 and 4 or 110 miles north the Roadless Area Focus Area. (4) Alternative B - The Proposed Action with no treatment of the Roadless Area Focus Area.

The PROPOSED ACTION

Several activities are proposed to move the project area toward the desired condition and meet the purpose and need for the project. These include: (1) Timber Harvest; (2) Aspen Regeneration; (3) Establish Defensible Fire Suppression Zones; and (4) Inactivate Management Ignored Prescribed Fire (See Figure 1). Activities Proposed

1. Treatments in conifer forests, including commercial tree harvest, forest regeneration activities, fuelwood removal or burning and road construction/reconstruction required to support commercial harvest activities.

   From 1998 to 2000, about 1,210 acres of current or recently infested spruce stands are proposed for commercial salvage harvest to remove dead and dying trees. An additional 1,661 acres of spruce forest adjacent to these sites has been ranked for salvage harvest. These sites have been proposed for commercial sanitation and improvement cuttings. Altering stand conditions is intended to result in vegetative characteristics less favorable to a spruce beetle infestation (Schmal and Frye 1976). These treatments will reduce overall tree densities, lower the average size class and result in a change in spruce diversity. The proposed treatments would include the use of only ground based (harvester logging) systems in the wet, fall and summer seasons. Commercial salvage, sanitation and improvement cuttings are scheduled to occur in 1999 through 2000.

Commercial treatments are proposed for the northern portion of the SERP area, where the spruce beetle epidemic is occurring. The area has been subdivided into five Focus Areas which are listed by priority: a) Hancock Peak, b) Loinder State, c) Spruces, d) Steam Engine, and e) Buckner.

a. Hancock Peak

The Hancock Peak Focus Area contains 3107 acres of which 2799 acres are in Management Area 1 (general direction 270 degrees), 208 acres are in 28 road bordered natural regeneration; and 88 acres in 9A impaired management. Hancock Peak was previously harvested in 1990-92 with an even-aged, shelterwood treatment. Most of the

Spruce Ecosystem Recovery Project FEIS

Alternatives, Including the Proposed Action

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Cedar City Ranger District
Dixie National Forest

Alternatives, Including the Proposed Action

remote the trail so that it remains on the Forest. A no treatment buffer (up to 300 feet) on adjacent forested areas will be left along the remoted section in the Focus Area.

- The Bunker Focus Area contains 381 acres all in Management Area 1. Treatment proposed for Bunker consist of salvage operations on 253 acres of a previously harvested site. Only the Left Fork of Bunker will be treated in this proposal. The Right Fork of Bunker will remain untreated. No new roads will be constructed. The existing roads will be closed to motorized travel upon completion of the project (approximately 1.8 miles). The Left Fork of Bunker Trail will not be remoted to avoid trail use over the existing road. The new route will parallel the existing road until it merges with the single track route.

Commercial Post-Harvest Treatment Work
The initial commercial salvage and sanitation operations are anticipated to start in 1998 through 2000. The potential for follow-up commercial salvage operations for five years following initial commercial operations is possible in the Hancock Peak Focus Area. All sanitation and improved treatments would be completed in the initial operation.

Non-Commercial, Pre- and Post-Harvest Treatment Work
Fuel reduction work. Activity fuels would be hand piled along all primary bike hiking trails. Stale highway U-143, and all system roads that would remain open, typically up to 100 feet either side of trail road, though could go up to 200 feet in some cases of road coverage and safety. Refer to mitigation measures for details on size and aspect of material that would be treated. The visibility distance would be primarily dependent on the degree of bark beetle mortality in the immediate foreground and damage to residual trees during the harvest operations.

Activity fuels, less than 3 inches in diameter, along fuel breaks would be machine and or hand piled in tractor units only. Fuel breaks established to meet the Forest Plan standards and guidelines would use natural terrain features as much as possible. Approximately 214 acres of machine piling will occur. Slash from road reconstruction temporary road construction would be piled and burned, burned or scattered.

Slash in areas outside of those areas described above which would require piling would be lopped and scattered to a maximum depth of 24 inches. Where this depth can not be achieved. Jackpot burning or piling and burning chipping of concentrated slash areas would occur.

All landing areas would be machine piled and burned. It is anticipated that up to 214 acres of machine piled and associate burning and chipping would occur as a result of fuels treatments discussed above (Steam Engine - 64 acres, Spruces - 90, Lowered State - 50, Bunker - 20). Also, slash not removed from temporary road construction is anticipated to occur on all 2,873 acres not to be treated.

Post-harvest reforestation work. Following salvage operations, approximately 1,200 acres are not expected to be fully stocked at levels necessary to achieve the desired future condition. To move the area toward the desired future condition for tree size class diversity and species diversity, these understocked areas would be replanted with Engelmann spruce to supplement expected natural regeneration of subalpine fir and aspen. On these acres, aspen and subalpine fir are allowed to represent up to 50 percent of the species mix. The timing of supplemental plantings would be dependent upon availability at that time and the availability of funds. Reforestation would be accomplished to approximately 966 acres is estimated to be artificially reforested (Steam Engine - 175 acres, Spruces - 321, Lowered State - 150, Bunker - 120, Hancock - 201).

Post-treatment timber stand improvement work. Precommercial thinning would not occur; however, damaged tree cleanup would be completed as necessary over the 1,661 acre Hancock Peak Focus Area. Damaged trees are expected to result from the commercial harvest entries and the majority completed by the contract purchaser through B and C provision requirements.

Transportation System Work. To salvage dead spruce. additional roads would be needed. Approximately five miles of temporary and specified road construction will occur. Also, approximately 18.5 miles of existing roads would require maintenance which includes grading and drainage clearances. Refer to Appendix E for existing and proposed transportation systems within the project area. New roads will be closed to public use after project activities are concluded so that no net increase in road density occurs. Techniques that effectively close the roads will be used, including restoring road approaches contours to their original shape. All temporary roads will be obliterated, returned to occur and resceded. In addition, approximately eight miles of existing roads in Focus Areas are proposed for closure upon completion of project activities. These roads are currently open and will be used for Focus Area access. The five mile transportation system in the Hancock Peak Focus Area will be closed. This is already documented in the Hancock Peak Environmental Assessment (1987). All landing sites, roads, and major skid trails will be revegetated using a seed mix native to the area.

Administrative road closures will occur on newly constructed temporary roads and roads in the Spruce Focus Area. Traffic will be limited to recovery project personnel until project activity is completed. When the project is completed all permanent road closures (previously described) will be installed.

2. Aspen forest treatments - Aspen forest regeneration as a result of commercial tree harvest, fuelwood removal, and prescribed fire.

Proposed aspen regeneration treatments would occur over five years on up to 21 percent (1,914 acres) of the estimated 9,181 acres of aspen type identified in the project area. The aspen regeneration would occur within the timber harvest Focus Areas previously identified, the prescribed fire Focus Areas, and the Deer Creek Focus Area which contains only aspen regeneration treatment sites. The Deer Creek Focus Area contains 772 acres of which up to 534 acres are proposed for prescribed fire. The timber harvest Focus Areas identified are comprised of both commercial and non-commercial activities. No road construction is associated with this proposal.

The analysis of the effects of the aspen treatments in Chapter Four is based upon the regeneration of all acres identified by alternative up to 1,914 acres. Implementation of these treatments are contingent upon many variables, including proper burning conditions, funding, and fuelwood or sawtimber demand. Since individual clones will be treated, treatment area layout will often times be somewhat smaller than the size of the sites delineated on maps and aerial photos. Also, other resource concerns and topographic limitations (i.e. wet areas, rocky areas) will be incorporated into unit design which may further reduce treatment areas over what is displayed on the alternative maps. Therefore, activities will probably not all occur within the five years proposed. Hence, the total aspen treatment areas will be somewhat less than the 21 percent identified in Chapter Four.

Non-commercial regeneration treatments will include one or more of the following actions:

a. Use of prescribed fire to remove 90 percent of the standing aspen clone. This technique encourages aspen regeneration through re-sprouting.

b. Fuelwood removal before and after prescribed fire treatment to reduce fuel loads. Downed trees will also be removed as Aspen clones are removed. Refer to Appendix F for existing and proposed fuelwood removal systems.

c. If prescribed fire treatments are not because of possible negative effects on recreation or urban interface settings, aspen will be felled and burned. Ninety percent (90%) of the aspen component would be removed to mimic prescribed fire objectives.

Commercial patch cut or clearcut treatments could be used in blocks of 40 acres or less. These treatments must be within 1 mile of an existing road and contain enough quality and volume to meet economic objectives to justify a commercial harvest. Mechanical treatments (fuelwood or commercial harvest) with or without fire are proposed occur in the aspen sites in the following Focus Areas: Spruces - 143 acres, Hancock Peak - 96 acres, and Lowered State - 67 acres.

3. Establish definable fire suppression (DFS) zones on National Forest System lands along travel corridors and in sites adjacent to other land ownerships (private land, national monument, etc.). These sites generally have higher resource values in addition to a higher incidence of human-caused fire risk. Travel corridors are identified as existing DFS zones. With minimal costs for improvement, these corridors can provide suitable fire breaks for suppression of wildfire.

Treat identified DFS zones where fuel loading (material on the ground) is higher than 10 tons per acre. Fuels would be reduced to less than 10 tons per acre and ladder fuels would be removed. Reducing ladder fuels and disposal of
created slash would be accomplished using mechanical and prescribed fire treatments. Hand and tractor piling, piling and burning, or chipping are methods used to reduce fuel loads. Approximately 41 acres adjacent to the Meadow Lakes Subdivision are proposed for BFS zone establishment. These zones would be up to 300 feet wide (approximately 150' wide on each side of the roads and actual widths would be determined by the District FMO and Zone Landscape Architect.

4. Reintroduce fire in areas where fire's influence has been reduced from it's historical role. Through prescribed burns, fuels can be safely reduced to historical levels. The size, pattern, and severity of the burns and associated smoke will be controlled by reintroducing fire under specific conditions and at specific times of year.

In addition to using prescribed burns for aspen regeneration, this technique will be used to reduce fuel loads and to improve the structural and species diversity of the vegetation in the Roadless Area and Chicken Head Focus Areas. These Focus Areas contain 2,700 and 1,100 acres respectively. The Roadless Area Focus Area is nearly all in MA 2A. Chicken Head has about 700 acres in MA 1, 420 acres in MA 6A, and 30 in MA 9A. Current fuel loadings indicate that a stand replacement fire event could occur in the fire groups present in these Focus Areas. By controlling the time of year and point-of-ignition of a fire, resource managers can influence a fire's behavior and have more control of the fire effects.

The role of fire is to create a heterogeneous pattern of species mix and structure classes (increased diversity). A mixed severity fire regime produces vegetation mosaics due to patchy nature of the fire, preventing development of large continuous blocks of homogeneous ages and species (Atkinson et al. 1999).

A variety of other components are analyzed prior to lighting a management ignited fire. Some of these are ensuring a burn pattern is in a mosaic, to better mimic natural patterns; maintain 50 percent of live vegetation in a closed canopy condition; prioritize burning in areas affected by spruce beetle to maintain the representation of live, green forests; and avoid burning in areas designated as old growth as defined by Hamilton et al. 1993.

Refer to Project File, Exhibit 17 for the location/site list of treatment areas identified and burn plans for further evaluation criteria (See Figure 2: Proposed Action Treatment Summary Maps).

NO ACTION (CURRENT MANAGEMENT)

An analysis of the "No Action" alternative is required by regulation and is therefore a part of this FEIS.

The No Action alternative would not commenced to remove beetle killed or infested trees, regenerate aspen, initiate management ignited fire, or establish defensible fire suppression zones in the SERP area.

The transportation systems BFS trails and roads would remain the same. No new roads would be built or reconstructed. Existing road systems would remain in place.

There would be no management activity to reduce fuel loading.

Current management would continue, including harvesting along existing roads for fuelwood, post and poles.

There would be no restriction to recreation activities from that which is currently happening.

No receipts would be collected from timber harvest to be used for reforestation of openings created by insect killed trees, or other rehabilitation efforts. All reforestation would be through natural processes.

ALTERNATIVE A - THE PROPOSED ACTION WITH NO TREATMENT OF THE CHICKEN HEAD AND SPRUCES FOCUS AREAS AND SITES 3 AND 4 IN LOCATION 110 IN THE LOWERSTATE FOCUS AREA

Alternative A has been designed to address Issue #2 in part, i.e. the effects of the proposed actions on the recreation related economy to Brian Head Town and Issue #3, the effects of proposed activities to the undeveloped character of
### Table 2-2: Comparison of Alternatives

<table>
<thead>
<tr>
<th>MEASUREMENT / INDICATORS</th>
<th>Proposed Act</th>
<th>No Action</th>
<th>Alt. A</th>
<th>Alt. B</th>
</tr>
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<tbody>
<tr>
<td><strong>Total Acres Treated (roadless)</strong></td>
<td>7,821</td>
<td>0</td>
<td>6,081</td>
<td>5,029</td>
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<tr>
<td><strong>Timber Harvest</strong></td>
<td>2,872 (464)</td>
<td>0</td>
<td>2,552</td>
<td>2,872 (464)</td>
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<td>Aspen Regeneration</td>
<td>1,013</td>
<td>0</td>
<td>697</td>
<td>1,013</td>
</tr>
<tr>
<td>Prescribed Fire</td>
<td>3,895 (2,792)</td>
<td>0</td>
<td>2,792</td>
<td>2,792</td>
</tr>
<tr>
<td><strong>DFS Zones</strong></td>
<td>41</td>
<td>0</td>
<td>41</td>
<td>41</td>
</tr>
</tbody>
</table>

| **Road Development/Improvement**          |              |           |        |        |
| Total Constructed (roadless)              | 4.0         | 0         | 0.0    | 4.0    |
| Total Prelim Maint                        | 18.5        | 0         | 18.0   | 18.5   |
| Total Const. Temp                         | 1.0         | 0         | 1.0    | 1.0    |

| **Road Closure/Density**                  |              |           |        |        |
| Miles Closed (new)                        | 4.0         | 0         | 4.0    | 4.0    |
| Miles Closed (extend)                     | 8.0         | 0         | 8.0    | 8.0    |
| Miles Obliterated (temp)                  | 1.0         | 0         | 1.0    | 1.0    |
| Total Miles of Open Road                  | 193         | 201       | 193    | 193    |
| Miles Road Square Mile                    | 2.33        | 2.43      | 2.33   | 2.33   |
| Miles Rd. Sq. M. Duering                  | 2.87        | 2.87      | 2.87   | 2.87   |

| **Number of Anticipated Days of Closure by Area (for Safety)** |              |           |        |        |
| Dark Hollow Trail                          | 5.10        | 30        | 0      | 5.10   |
| Hancock Peak                               | 15          | 0         | 15     | 5      |
| Spruce Trail                               | 20.40       | 0         | 20.40  |        |
| Acres of Unstocked Openings                | 750         | 750       | 750    | 750    |

| **Reforestation Acres**                    |              |           |        |        |
| Artificial Plant                           | 966          | 0         | 645    | 966    |

| **Fuel Treatment Acres**                   |              |           |        |        |
| Lop and Scatter                            | 2.872        | 0         | 2.552  | 2.872  |
| Pile and Burn                              | 2.14         | 0         | 1.34   | 2.14   |

| **Acres Meeting Old Growth**               |              |           |        |        |
| Before Action                              | 6,642        | 6,642     | 6,642  | 6,642  |
| After Action                               | 6,642*       | 6,642     | 6,642* | 6,642* |

| **Economic Measures**                      |              |           |        |        |
| PNV (4%)                                   | $303,956     | (916.55)  | $292,765 | $361,327 |
| Jobs generated**                           | 135          | 0         | 116    | 135    |
| Income generated**                         | $7,049,900   | 0         | $5,278,000 | $7,049,900 |
| Volume Removed (MBF-CEC)                   | 18,700.36,800| 14,000.27,556 | 18,700.36,800 |

| **Projected Service Integrity along**      |              |           |        |        |
| Concern Level 1 & 2 Trailsways             |              |           |        |        |
| 2002****                                  | Low-Very Low | Moderate-Low | Moderate-Low | Low-Very Low |
| 2012****                                  | Low-Very Low | Moderate-Low | Moderate-Low | Low-Very Low |
| 2052****                                  | Low-Very Low | Moderate-Low | High-Moderate | High-Moderate |

| **Maximum Acres proposed for**             |              |           |        |        |
| Prescribed Burning**                       | 4908         | 0         | 3489   | 2116   |

* No effect from timber harvest, no effects from fire since fire will not be initiated until space is cleared in the roadless area.

** Jobs generated based on 8.1 jobs per acre (Robinson and Barron, 1991).

*** Income generated based on $37.00/MBF-CEC (Robinson and Barron, 1991).

**** 2002 is anticipated end of SEEP Project, 2012 is ten years following completion, 2052 is fifty years following completion.

***** This is the maximum acres that could be burned under this proposal. Aspen treatments may be harvested for hardwood, etc. instead of prescribed burning.
CHAPTER THREE

AFFFECTED ENVIRONMENT

INTRODUCTION

This chapter will describe the existing and past conditions by resource. In order for us to "manage for biodiversity and provide for viable populations (36 CFR 219.9)" we must first review the existing project area and understand the elements, including human, which have and will continue to interact throughout the landscape.

Chapter Three describes the portions of the physical environment that may be affected by implementation of the Proposed Action, and alternatives to the Proposed Action. Descriptions focus on resource conditions in the area potentially affected by the alternatives. The description of existing conditions provides the basis for assessing the environmental effects of each alternative discussed in Chapter Four (Environmental Consequences) and assessing how the alternatives respond to the issues identified in Chapter Two.

A description of the existing and past resource conditions is contained in the watershed assessment (Project File exhibit 36). This assessment will be referenced in this Chapter to reduce bulk and redundancy.

FOREST LAND SUITABILITY

Suitability has been determined for each stand in the project area as required in the Dixie National Forest Land and Resource Management Plan (Forest Plan IV 57 and V 7). In making the site-specific determination of suitability, the following factors were considered:

- Is the land forested?
- Is technology available to ensure timber production from the land without irreversible resource damage to soil productivity or watershed condition?
- Is there reasonable assurance that each land can be adequately restocked as provided by law?
- Is timber production on the land consistent with multiple use objectives established in the Forest Plan?
- Is timber production on the land feasible considering other land use objectives, constraints, and mitigation needs?
- Is timber production cost efficient on these lands over the planning horizon?
- Has the land been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service?

Table 3-1 shows the project area acreage by suitability class. The Forest Land Suitability Map (Appendix I) displays the location of suitable and unsuitable acres within the project area.

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>CATEGORY</th>
<th>CFR REGULATION</th>
<th>ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable*</td>
<td>Forested Land</td>
<td>36 CFR 219.3</td>
<td>22,951</td>
</tr>
<tr>
<td>Unsuitable</td>
<td>Regeneration not assured or irreversible resource damage</td>
<td>36 CFR 219.14(a)(3)</td>
<td>4,621</td>
</tr>
<tr>
<td></td>
<td>Developed for non-fe est use 1/</td>
<td>36 CFR 219.14(a)(2)</td>
<td>738</td>
</tr>
<tr>
<td></td>
<td>Non-forest lands</td>
<td>36 CFR 219.14(a)(1)</td>
<td>18,137</td>
</tr>
<tr>
<td></td>
<td>Economically or technologically unfeasible</td>
<td>36 CFR 219.27(b)(7)</td>
<td>6,910</td>
</tr>
<tr>
<td></td>
<td>Unclassified</td>
<td></td>
<td>372</td>
</tr>
<tr>
<td>TOTAL ACRES</td>
<td></td>
<td></td>
<td>52,991</td>
</tr>
</tbody>
</table>

1/ Acres included in Suitable and unsuitable categories

Suitability determinations for the SERP area was made based primarily on soil capability, and administrative use criteria.

The areas proposed to occur on lands classified as unsuitable therefore, discussion of suitability will not be carried forward into Chapter Four.

VEGETATION RESOURCE

This section discusses the vegetation in the SERP area and includes the nine Focus Areas where activities are proposed to occur. The descriptions are organized under the four criteria determined to be part of a properly functioning ecosystem (Anandsson et al. 1996). An ecosystem that is properly functioning is thought to be resilient to perturbations in structure, composition, and biological or physical processes. Systems at risk are those that may be degraded beyond the range of resiliency and sustainability. The four ecosystem characteristics discussed are structure, composition, disturbance regime or processes (insect and disease, fires), and patterns.

Also discussed in this section are threatened, endangered, proposed, and sensitive plant species and the occurrence of noxious weeds in the project area.

The vegetation discussion is based on the Ranger District's stand examination data base. This data base contains information which is systematically collected following Regional guidelines and can be queried to provide vegetation attributes used in analysis such as the SERP. A description of the reliability of the data base is contained in the Project File (Exhibit 17).

Moisture/humidity relationships, air and soil temperature, sunlight penetration, and wind patterns interact to produce the prevalent microclimate that influences vegetative patterns and growth on the landscape. How microclimate factors interact and influence vegetation is identical to that described in other environmental documents prepared for projects in this forest type (Sierra Valley Recovery Project, EA 1994 pp 3-1, 2).

VEGETATIVE STRUCTURE

Structure is a means to express the balance of age and size classes for each vegetation type. In a forested environment vegetation structure also includes stumps, down logs and woody debris, old growth, and canopy closure.

SIZE CLASS DISTRIBUTION AND CANOPY COVER

Stand characteristics derived from recent stand examination data were compared to the forest structural characteristics described in the Management Recommendations for the Southern Utah Region (Reynolds et al. 1992) which recommends a distribution of tree sizes to maintain over a landscape that would maintain forest cover for most wildlife species. At this time, for assessing vegetative structure, the Dixie National Forest is drawing in the intent of these management recommendations, realizing that not all situations described in

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affected

that publication occur in the Intermountain Region (i.e. some prey species do not occur here) and some forest cover types occur here that are not described in the Recommendations (i.e. extensive aspen stands and lodgepole pine).

Based on Reynolds et al. (1992) and Amundsen et al. (1996), the desired distribution of structural stages in spruce-fir forests over a landscape would be: About 10% of the forest in a grass/forb/shrub vegetative structural stage (VSS 1); 15% in seedling/saplings (VSS 2); 20% in Young Forest (VSS 3); 20% in Mid-aged Forest (VSS 4); 20% in Mature Forest (VSS 5); and 20% in Old Forest (VSS 6). Based on information provided by Amundsen et al. (1996), the desired distribution for aspen across a landscape would be about 40% in VSS 1 and 2, 30% in VSS 3, 4 and 5; and 30% in VSS 6. These types of distributions would maintain forested landscapes through time in properly functioning conditions. Since VSS’s are based on the predominate tree size (diameter) class in the stand, it appears questionable if VSS’s will ever approach 20 percent in stages 5 and 6 under unmanaged, uneven-aged conditions in the spruce-fir forests (Dietzschlager et al. 1997, pp. 17-18). A size class distribution where 60% is represented in the combination of VSS’s 4, 5, and 6 may be more realistic. Similarly, in mature, unmanaged aspen areas average stand diameters of more than 24 inches rarely occur in the project area. As shown in Table 3-2, the data base for the SERP area indicates just 140 acres or two percent of the aspen component is in VSS 6.

In addition to describing a desired condition for the vegetation structure over a landscape, Reynolds (1992) also prescribes percent canopy closure for Mid-aged, Mature, and Old Forests. This is intended primarily to maintain moist conditions for fungi growth which is a major food source for goshawk prey. In boreal areas in spruce-fir forests, the desired condition for Mid-aged stages is one third should have 60% (C) canopy cover and the remaining two thirds, greater than 40% (B) canopy cover.

Table 3-2: Existing conditions within the SERP area based on 1996 exam data. (*Total acres in the SERP area = 52,991; National Forest Lands = 88,274; Private lands = 34,974; Forested cover type = 34,026 NF, and 2651 on private land; Total forested cover type = 37,577).

<table>
<thead>
<tr>
<th>FOREST TYPE</th>
<th>National Forest Lands (ac)</th>
<th>% of NF Forested Acres</th>
<th>Private Land (Acres)</th>
<th>% of Private Land Forested Acres</th>
<th>% of Total Forested Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer forest</td>
<td>26,750</td>
<td>77</td>
<td>1,646</td>
<td>62</td>
<td>76</td>
</tr>
<tr>
<td>Aspen forest</td>
<td>8,176</td>
<td>23</td>
<td>1,005</td>
<td>38</td>
<td>24</td>
</tr>
</tbody>
</table>

| SIZE CLASS DISTRIBUTION FOR CONIFERS | 0-1 in.
| DMH | 642 | 7 |
| 1.5-2 in.
| DMH | 1,414 | 4 |
| 2.5-3 in.
| DMH | 4,502 | 17 |
| 12-18 in.
| DMH | 12,106 | 45 |
| 18-24 in.
| DMH | 1,821 | 7 |
| 24+ in.
| DMH | 6,265 | 23 |

| SIZE CLASS DISTRIBUTION FOR ASPENS | 0-1 in.
| DMH | 21 | 1 |
| 1.5-2 in.
| DMH | 24 | 3 |
| 3-12 in.
| FDMH | 2,094 | 36 |
| 12-18 in.
| FDMH | 4,712 | 58 |
| 18-24 in.
| FDMH | 126 | 2 |
| 24+ in.
| FDMH | 140 | 2 |
| Conifer forest | 26,750 | 55 | 1,646 | 35 | 53 |
| Aspen forest | 8,176 | 17 | 1,005 | 22 | 34 |
| Gram cover type | 8,057 | 17% | 1,751 | 38% | 29 |
| Rock | 3,920 | 8% | 15 | 1% | 2 |
| Shrub cover type | 416 | 1% | 52 | 1% | 1 |
| Urban/developed area | 0 | 0 | 210 | 4% | 2 |

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For Mature and Old Forests, the desired condition is 40% (C) canopy cover. However, data collected indicates that development of a canopy cover 60% or greater in the larger sized trees is not common except in clumps. In addition, stands averaging 40-60% canopy cover (B) have elements meeting the intent of the greater canopy cover. Therefore, in the following discussions B and C cover classes are lumped for the Mature and Old Forest stages and the goal is to maintain as many acres as possible in these stages in greater than 40% canopy cover as a stand average. In the conifer forests within the SERP area, data indicates that about 16 percent of the Mid-aged Forests have a canopy closure of 40-60 percent while the remaining (74%) have a canopy closure of greater than 60 percent which meets the desired condition. About 83 percent of the Mature and Old Forests have a canopy closure of greater than 40 percent. The non-spruce-fir conifer forest have similar desired canopy cover conditions so they were lumped with spruce-fir in calculating canopy cover. Less than seven percent of the conifer forest is comprised of species other than spruce-fir.

OPENINGS WITH LESS THAN 30 PERCENT CANOPY CLOSURE

According to the Forest Plan SAG (40-65-67 E03/06, & 67/5A), a cut-over area is considered an opening until minimum stocking levels (150 trees/acre for spruce-fir, 300 trees/acre for aspen) and a canopy closure of 30 percent are achieved over most of the area (60% for spruce-fir and 75% for aspen). Due to bark beetle activity, this condition occurs or is expected to occur in the spruce-fir stands in the timber harvest Focus Areas without management activity. In the Hancock Peak Focus Area the current canopy closure is primarily more than 40 percent. In the aspen sites proposed for regeneration by fuelwood cutting or commercial harvesting, created openings would result. Since it is not known specifically what aspen sites will be regenerated with these treatments, all the aspen treatment areas exclusive of the prescribed fire Focus Areas will be discussed in Chapter Four as being created openings.

Table 3-3. Existing VSS and canopy cover compared to desired conditions for spruce-fir forests, 1996 data. (There is no desired condition stated for Mid-Aged, Mature, and Old Forest A cover class, so these stages are shown without a "desired condition"). A = <40%, B = 40-60%, C = 60% canopy closure.

<table>
<thead>
<tr>
<th>VSS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4A</th>
<th>4B</th>
<th>5.6A</th>
<th>6B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desired % Of Forested Acres</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>0</td>
<td>7</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Existing % Of Forested Acres</td>
<td>2</td>
<td>5</td>
<td>18</td>
<td>7</td>
<td>9</td>
<td>30</td>
<td>5</td>
</tr>
</tbody>
</table>

As shown in Table 3-3, the majority of the conifer forest in the project area is in the Young Forest and Mid-aged Forest structural stages (Refer to Project File, exhibit 17 for stand classifications) based on the most dominant diameter class. However, stands in the project area are generally multi-staged and contain a variety of diameter classes and changes in one or more classes could change the dominant VSS. Using the most dominant structural class is a useful method for tracking desired versus existing conditions.

Based on the desired condition described by Reynolds (1992), Table 3-3 shows a deficit in the Grass/Forb/Shrub, Seedling/Sapling, and the Mature/Old Forest stages with excesses in the Mid-aged stage (based on the most dominant VSS present in 1996) for the conifer forests on the SERP area. Based on field review of the Focus Areas the percentages shown in the VSS-4 and above are high as those areas are being converted to VSS-1, 2, and 3 by the spruce-fir. Table 3-4 shows the desired versus existing condition of the aspen forest area in the Mid Forest stage (Refer to exhibit 17 for the younger VSS’s).

Table 3-4. Existing VSS and canopy cover compared to desired condition for aspen forest, 1996 data. (There is no desired condition stated for canopy closure for aspen).

<table>
<thead>
<tr>
<th>VSS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4,5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desired % Of Forested Acres</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Existing % Of Forested Acres</td>
<td>3</td>
<td>95</td>
<td>2</td>
<td>95</td>
<td>2</td>
</tr>
</tbody>
</table>

SNAGS, DOWN LOGS, AND WOODY DEBRIS

As indicated in Table 3-2, the SERP area generally contains the desired number of larger snags but is lacking in the amount of large down woody material necessary to maintain soil productivity and meet structural diversity needs. Bark beetle activity in the project area has increased the number of snags per acre, so it is expected that as the snags begin to fall the fuel loading will move toward the desired condition.

There is no information available on the amount of down woody material present in each stand. Estimates were based on the dominant tree species. If a stand is dominated by spruce, it was assumed to have 15 tons per acre; if a stand is a mix of species, it was assumed to have 10 tons per acre. If a stand was more than 50 percent aspen, it was assumed to have five tons per acre. For a detailed stand by stand summary refer to the Project File (Exhibit 17).

OLD GROWTH

Forests in, or approaching, the later stage of ecological succession are termed "old growth". These forests play an important role in maintaining biological diversity. Old growth forests have a unique structure and composition that provides important habitat for a wide range of associated plant and animal species, as well as a variety of other biota. Old growth forests also have other intrinsic social and recreational values. Stands in the project area were rated to determine if they met structural requirements to be classified as old growth based on Characteristics of Old Growth Forests in the Intermountain Region (Hamilton 1993). Hamilton discusses two ecological conditions, based on site productivity, which influence the structural attributes of old growth spruce/fir stands. After review of the forested stands in the SERP area, stands with a strong south to west exposures were classified as belonging to a "Cold/humidity" environment, the remaining stands were considered more productive and were classified as "Warm/humidity". Structural features necessary for an old-growth include:

- Presence of large, mature trees;
- Variations in tree sizes;
- Accumulations of large dead and fallen trees;
- Deciduous in the form of broken or deformed tops, and diseases;
- Multiple canopy layers.

Based on the above structural characteristics defined for each ecological classification (cold/humidity versus warm/humidity), a total of 6,642 acres (18% of the forested acres) were classified as old growth using 1996 data. The stands rating as old growth are generally scattered stands, not continuous blocks which may be more desirable to some wildlife species. Refer to Project File (Exhibit 17) for Old Growth Map. The old growth classification system also includes an age requirement. Many of the stands included in the old growth acres do not appear to meet the minimum age, but they do meet the other structural requirements listed above.

VEGETATIVE COMPOSITION

Vegetative composition refers to the dominant species present and their relative abundance. It includes the recruitment and sustainability of early seral species while still providing the diversity of all successional species (flora and fauna).

NON VEGETATED AREAS (4,295 ACRES)

Non-vegetated areas include rock (3,935 acres), water (60), and developed areas (210).

NON FORESTED AREAS (11,209 ACRES)

Non-forest areas are generally described by current species composition or vegetative community. Non forested areas include grassland (9,849 acres), shrubland (468), and wet meadows (901). These areas are greater than five acres in size; non-forested areas other than this are considered to be an integral part of the forested stands.

There are several small riparian areas in the project area. These are generally associated with creeks, springs or seeps. They range in size from about 1/4 acre to 1 acre. Refer to the "Critical Watershed/Soils Areas" map in Appendix 4 for locations. 
FORESTED AREAS (37,577 ACRES)
Forested areas include aspen (9,181 acres), alpine fir (285), blue spruce (188), Douglas-fir (1,013), Engelmann spruce (3,844), limber pine (23), white fir (444), and spruce-fir (22,599).

In forested environments, habitat types can be used to describe the potential plant communities. Habitat types integrate environmental factors that affect vegetation (i.e. soils, aspect, topography, climate). Forested lands are divided into habitat types based on potential climax vegetation described in Coniferous Forest Habitat Types of Central and Southern Utah (Youngblood and Mauk 1985). The habitat type classification system integrates all environmental factors which affect vegetative communities, but does not reflect current vegetative composition since it is based upon the potential vegetation community that would develop without a disturbance event affecting the successional processes. Most stands in the project area fit best into the Abies lasiocarpa/Ribes montigenum (ABLA/RIMO) and Picea engelmannii/Ribes montigenum (PIEN/RIMO) habitat types. The major differences between the two types is the lack of large numbers of subalpine fir and aspen in the PIEN/RIMO type; the presence of these species is accidental in a mature stand. Both have generally sparse understory vegetation except in open or disturbed areas, or near wet, seep areas.

A description of the spruce-fir and aspen forests can be found in the Effects of Fire and Timber Harvesting on Vegetation (Eisenhauer and McGinn 1997).

NOXIOUS WEEDS
There are no known populations of noxious weeds in or around the project area. Common sources of noxious weeds include heavy equipment that has been operating in agricultural areas that have noxious weeds and hay or straw used for livestock feed, or for mulch. Due to the proximity of private lands and Highway 143, which bisects the area, there is a possibility for noxious weed seeds to be introduced into the area. However, the potential for population establishment is considered low due to the high elevation of the project area (R. Houston, pers. comm.). Due to the low probability of noxious weed infestation, this will NOT be carried into Chapter Four.

VEGETATIVE PROCESSES (INSECTS AND DISEASES)
Insect activity, primarily bark beetle populations, have been building on the Cedar City District for the past several years. Spruce beetle has caused the most significant change across the spruce-fir landscape. When populations reach outbreak or epidemic levels, they can effect major changes on stand composition, structure, and pattern over widespread areas.

SPRUCE BEETLE (Dendroctonus rufipennis)
The most important beetle within the project area is spruce beetle due to its ability to affect large areas of susceptible spruce forests. Initially adult beetles are attracted to downed spruce caused by various disturbance regimes, generally windthrow. As beetles emerge from the downed material they attack the larger, more mature standing spruce if additional downed trees are not available. If conditions are favorable, abundant host type coupled with periods of drought can cause populations to build rapidly. As the larger host material is killed, subsequent attacks are directed at smaller diameter hosts. Adult beetles generally fly short distances to reach suitable host material, however as they deplete the host food source, dispersal distances will increase. This flight behavior results in host mortality far in advance of the infested area. This type of scenario is presently occurring within the SERP area on the Cedar City Ranger District (Forest Health Protection (FHP) Aerial Survey Maps, 1991-1996: Project File, exhibit 18).

Aerially observed tree mortality was first detected by the FHP aerial survey in 1991. Five scattered small pockets consisting of 10-20 dead trees and a 100 tree pocket of mortality was initially mapped on private and Forest Service land during the 1991 survey. Spruce mortality was estimated at approximately 215 trees. By 1993, pockets of mortality had increased to 11, with the initial 100 tree pocket of dead expanding to 300 trees in the Navajo Lake area. Another large pocket of spruce mortality was observed northeast of Brian Head Peak consisting of 100 dead spruce. The infestation had spread throughout the northern portion of the analysis area which included Rainbow Meadows, Sidney Valley and south of Highway 143 into Hancock Peak. Spruce mortality within the SERP area over all ownerships, encompasses 45,000 trees over approximately 7,400 acres. The mortality estimate only includes trees aerially mapped through 1995. Trees attacked by spruce beetle in 1996 are not included in this estimate since visual symptoms detected during an aerial survey would not appear until the summer of 1997. Although the 1997 FHP aerial survey has been completed, the data has not been summarized or field checked by
FHP staff. Unless natural forces cause a collapse of the spruce beetle population, it is expected to increase in intensity until most of the susceptible food source is depleted on the Cedar City Ranger District. The current outbreak could easily extend into the next century.

Table 3-5 summarizes annual spruce mortality within the SERP area from its initial detection in 1991 through 1996. The threefold increase in tree mortality from 1991-1995 was due primarily to an increase in spruce beetle populations within Sidney Valley and the Brian Head area (Ambold 1994). The decrease in spruce mortality in 1994 is due to the beetles' two-year life cycle and the absence of aerial visual symptoms during the year of initial attack. By 1996, spruce mortality had increased to 23,419 trees extending south of Highway 143 into the Hancock area.

Table 3-5. Spruce mortality by year in the SERP area. (Estimated from aerial survey maps.)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KILLED</td>
<td>1,500</td>
<td>1,946</td>
<td>6,200</td>
<td>3,900</td>
<td>6,900</td>
<td>23,900</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44,400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Endemic spruce beetle populations are generally kept low by natural predators (woodpeckers, insects, etc.) but they are not controlled by natural predation. Laboratory studies indicate that temperatures at 15 degrees F under the bark will kill adult beetles and temperatures exceeding 90 degrees F will kill all life stages. Laboratory studies summarized from Brian Head and Bladen (7 miles south of the project area) weather stations since 1994 indicates that temperatures do occasionally reach 15 degrees F. However, snow depths occasionally exceed 50 inches, which provides thermal protection for overwintering life stages (Project File). Establishment of successive host trees has held a certain percentage of adult beetles until the tree will overwinter. This type of behavior restricts overwintering adults from lethal winter temperatures and predators.

A number of factors are responsible for the current outbreak of spruce beetles. These factors include: stand disturbance in the late 80's and early 90's (primarily windfall), high tree densities, an abundant food source and site conditions for beetle development. Following the drought years of the late 80's and early 90's, the higher than normal snow-pack of 1993 also allowed for higher overwintering survival rates of spruce beetle.

Stand exam data collected through 1996 indicates that spruce beetle have killed up to 30 percent of the stand exceeding 16 inches in diameter within infested areas in the SERP area. The heaviest mortality is in sites infested from 1991-1995. Approximately 7,400 acres of the 28,360 acres of forest component in the project area is heavily infested. If natural factors do not cause a collapse of the spruce beetle population, it is expected most of the mature spruce forest component within the project area will be infested by spruce beetle.

WESTERN BALSAM BARK BEETLE (Dendroctonus frontalis)

This beetle is attacking subalpine fir throughout the project area in small groups and scattered individual trees. It is not as aggressive as the spruce beetle and is generally associated with drought periods or trees infected with root disease (Johnson 1992). Unlike the spruce beetle, tree mortality associated with this beetle tends to fluctuate with drought or other types of stress i.e. budworm outbreaks. It can cause wide-spread mortality, but with areas of moisture, populations of this beetle should return to endemic levels, posing little threat to stands in the project area for this time. Therefore, discussion of this bark beetle will not be carried forward into Chapter Four.

ANNOUNCED ROOT DISEASE (Heterodendrium annunus)

From a forest management perspective, this is the most important disease infecting conifers in the project area. It is found primarily on subalpine fir for 60% of the stand area or 39% of the project area and is believed to infect subalpine fir in pockets of less than 500 acres. The risk of spread of this disease is low to moderate due to the slow aggressive strain of the disease that appears to be in the area. Mortality caused by this disease is minor at this time. Therefore, discussion of this disease will not be carried forward into Chapter Four.

PRESENT IMPACTS OF INSECTS AND DISEASES IN ASPEN

Two insects have been observed attacking aspen, though in very limited areas:
1. Tent caterpillars (Malacosoma spp.)
2. Poplar borers (Saperda calcarata)

Diseases affecting aspen in the area include:
1. False Timber Fungus (Phleum tremulae) [Bud,] Bud & Boritza.
2. Stoozy bark canker (Ceratocystis fagacearum) [EF & Exterior] Torkelson & Eckblad.
3. Black Canker (Ceratocystis fumrhiata Ell & Halst.)
4. Cytopora canker (Cytopora chrysosperma [pens FL])

At the present time, these insects and diseases are at endemic levels, for the area, not causing extreme mortality. Implementation of any of the alternatives discussed in this document will not be expected to alter this situation. Therefore, discussion of insects and diseases affecting aspen will not be carried into Chapter Four.

Bark beetle risk: Previous studies conducted by Schmid and Frye, 1976 indicate particular stand characteristics are susceptible to spruce beetle attack. Stands considered high risk have the following attributes: 1) located in well-drained crevices, bottoms or drainages, 2) the average tree diameter is 16 inches or greater, 3) high tree densities ( exceeding 150 square feet of basal area), and 4) spruce composition within the stand exceeds 65 percent. Stands with attributes less than those described above would receive a lower risk rating. Based on data collected in the infested sites stands, with these attributes have been infested. All infested stands with a VSS 3 classification or greater have been attacked by spruce beetle. If this trend continues, an additional 19,000 acres of spruce forest within the project area is susceptible to spruce beetle infestation.

VEGETATIVE PATTERNS

Patterns are an indication of how ecosystems function among and between themselves. Vegetative attributes of patterns include size, shape, age class, distribution, fragmentation and connectivity.

The SERP area was occupied by a fairly contiguous mature to old spruce-fir forest before the current spruce beetle epidemic. This forest appears to have been replaced about 300 years ago as a result of large, stand replacing fires, insect epidemics, or a combination of the two. It has since grown through the successional stages of a maturing spruce-fir forest and in 1996 was approximately 70 percent Mid-aged to Old Forest (VSS 4-6, diameter greater than 12 inches). The age of the 7,400 acres of the 28,360 acres of forest component in the stands exceed 250 years throughout the project area. This forest is interspersed with large meadows and rock areas. Large areas where aspen dominates the forested environment are also represented throughout the project area. These forests are over 90 percent Young to Mid-aged Forests (VSS 3-4, diameters 5.18 inches). Many spruce-fir stands contain a significant component of mature aspen that is being replaced by the more shade tolerant conifer species. Aspen typically dominates sites adjacent to meadows and wooded areas which are, in many cases, more frequent and less severe fire regime than sites dominated by spruce-fir. The recent fire suppression efforts have probably affected the historical fire regime in the aspen areas which resulted in a structural condition that is outside of the range of a properly functioning condition (Amandsen et al. 1996).

Because of recent fire suppression tactics and lack of evidence of large scale disturbance fire like beetles, the areas dominated by mature forests is probably near the maximum level as indicated by the recent beetle epidemic. This beetle caused mortality is changing large areas (about 7,400 acres) from VSS 4-6 to VSS 1, 2 or 3, depending by representation of aspen most susceptible like alpine fir and aspen. This is changing areas with a very consistent, late successional pattern of vegetation to areas dominated by an early successional, more open and variable pattern.

FRAGMENTATION

Many plant and animal species are adapted to living in the interior of forest stands and others utilize open environments or habitat boundaries such as forest margins (edges). Each species has evolved over thousands of years and populations are adapted to particular environments. When habitat conditions change as a result of plant succession, climatic changes, or various influences brought about directly or indirectly by humans, the survival potential of the species may change. A species may either increase or decrease depending on the type or amount of change. When changes favor a species, the population may spread into favorable habitats and increase. When

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altered habitat conditions result in increased mortality or lowered reproductive rate, the population will decline unless it can be supported by immigration from nearby areas (Robbins 1979).

Especially important to interior forest habitat species are large blocks of mature forests which are connected to other large blocks of forests. A trend in many forested areas is large forest blocks are being broken up (fragmented) and becoming isolated, as connections (corridors) between forests are fragmented into smaller pieces by human induced or natural events. Minimum block size has not been agreed upon, the general rule is larger blocks are better in order to maintain forested areas that are not affected by edge. Also to minimize edge effects, the blocks cannot be long and narrow. Blocks approaching circular would minimize the proportion of edge to forest interior.

Forests in the SERP area are somewhat naturally fragmented due to large meadows and rock areas. Additional fragmentation has occurred due to roads, ski area development on the Forest and private land, and additional development on adjacent private lands. The most continuous forested area in the project area is the central area in the Hancock Peak Focus Area and the adjacent Roadless Area. This area comprises over 10,000 acres.

**THREATENED, ENDANGERED AND SENSITIVE PLANT SPECIES**

There is no suitable habitat for any Federally listed threatened, endangered, proposed or candidate species in the SERP area. Table 3-6 shows the sensitive plants that could occur or have habitat with the SERP boundary and a brief summary of information leading to this conclusion regarding suitability. Among tamarisks, the only sensitive plant with no suitable habitat. There are documented occurrences of Arizona willow, Cedar Breaks Big sagebrush, Maguire camas, Navajo Lake milkvetch, and Reveals pamphlet.

**Table 3-6. Habitat suitability of sensitive plants in the SERP area.**

<table>
<thead>
<tr>
<th>SPECIES Scientific Name</th>
<th>HABITAT SUITABILITY BASED ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cedar Breaks Big sagebrush</td>
<td>Washakie limestone present.</td>
</tr>
<tr>
<td>Contraeris armata</td>
<td>X</td>
</tr>
<tr>
<td>Zon Junesa</td>
<td>No sandstone cliffs, slickrock slopes or hanging gardens</td>
</tr>
<tr>
<td>Maguire camas</td>
<td>Open calcareous and igneous gravels present in project area</td>
</tr>
<tr>
<td>Monotropa punctata</td>
<td>X</td>
</tr>
<tr>
<td>Arizona Willow</td>
<td>Present in the project area</td>
</tr>
<tr>
<td>Salix armenacea</td>
<td>X</td>
</tr>
<tr>
<td>Navajo Lake milkvetch</td>
<td>High elevation Washakie limestone formation present</td>
</tr>
<tr>
<td>Artemisia limberdick</td>
<td>X</td>
</tr>
<tr>
<td>Paradox meadow</td>
<td>Wet meadow areas present at suitable elevations</td>
</tr>
<tr>
<td>Betula grandis var. pacifica</td>
<td>X</td>
</tr>
<tr>
<td>Tatarian Thistle</td>
<td>Alpine areas on igneous gravels present</td>
</tr>
<tr>
<td>Castilleja parvida var. parvida</td>
<td>X</td>
</tr>
<tr>
<td>Reveals pamphlet</td>
<td>Washakie limestone present in project area</td>
</tr>
</tbody>
</table>

A Conservation Strategy and Agreement has been signed for Arizona willow (Arizona Willow Interagency Technical Team 1995). Each population is described in the strategy with conservation measures outlined. There are fifteen known populations within the 100-foot buffer zone in Cedar Breaks National Monument. These populations total approximately 961 acres. 541 acres are on Federal lands. Table 3.7 shows the names of each population, size, condition and potential threats.

Conservation needs identified in the strategy include site monitoring, implementing a 100 foot buffer (no harvests), construction of protection research excludes, recreational plans for ORV (off road vehicle) use, implementation of

<table>
<thead>
<tr>
<th>POPULATION NAME</th>
<th>SIZE (ACRES)</th>
<th>CONDITION</th>
<th>CONCERNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brian Head Peak</td>
<td>1 Healthy</td>
<td>Recreation trail</td>
<td></td>
</tr>
<tr>
<td>Brian Head Town</td>
<td>20 Healthy</td>
<td>Ski area development (private)</td>
<td></td>
</tr>
<tr>
<td>Bunker Creek</td>
<td>1 Herbivory evident</td>
<td>Recreation development, timber harvest</td>
<td></td>
</tr>
<tr>
<td>CCC Camp</td>
<td>42 Stunted</td>
<td>Sheep use, bedding, holding</td>
<td></td>
</tr>
<tr>
<td>Castle Creek</td>
<td>6 Herbivory evident</td>
<td>Cattle grazing if elk populations increase</td>
<td></td>
</tr>
<tr>
<td>Cedar Breaks</td>
<td>21 Herbivory evident</td>
<td>No concern identified in Cedar Breaks National Monument</td>
<td></td>
</tr>
<tr>
<td>East Power Line</td>
<td>37 Healthy</td>
<td>Road development to access private land</td>
<td></td>
</tr>
<tr>
<td>Hancock Peak</td>
<td>24 Healthy</td>
<td>None identified</td>
<td></td>
</tr>
<tr>
<td>Long Valley</td>
<td>4 Healthy</td>
<td>Recreation use possible</td>
<td></td>
</tr>
<tr>
<td>Lowder Creek</td>
<td>142 Healthy</td>
<td>Cattle grazing and recreation</td>
<td></td>
</tr>
<tr>
<td>Midway Face</td>
<td>3 Healthy</td>
<td>Timber harvesting and thinning</td>
<td></td>
</tr>
<tr>
<td>Power Line</td>
<td>14 Healthy</td>
<td>Road development to access private land</td>
<td></td>
</tr>
<tr>
<td>Rainbow Meadows</td>
<td>304 Healthy</td>
<td>Timber harvest, road and trail development, recreational use and private land development</td>
<td></td>
</tr>
<tr>
<td>Sheep Herder Camp</td>
<td>72 Healthy</td>
<td>Sheep bedding ground and horse pasture for hender</td>
<td></td>
</tr>
<tr>
<td>Sidney Valley</td>
<td>79 Herbivory evident</td>
<td>Cattle grazing, recreation use, water table conditions and elk use if populations increase</td>
<td></td>
</tr>
</tbody>
</table>

**CUMULATIVE EFFECTS AREA (CEA)**

The CEA for the vegetation resource discussion is based upon the project area boundary for SERP which is essentially the boundary of the spruce fir forest on the Northern Markagunt Plateau. The cumulative effects analysis will discuss how the vegetation landscape may be affected by action or no action in the SERP area, considering other past, present and foreseeable future actions. The CEA is within the upper portions of five National Forest System watersheds: Asp, Panguitch, Coal, Mammoth, and Parowan Creeks. Refer to Appendix 10 for a list of past, present, and future actions within the CEA that will be considered in the analysis in Chapter Four.
RECREATION RESOURCE

Recreation is a primary use of the lands within the spruce zone of the Markagunt Plateau. Brian Head Town and Ski Resort, Cedar Breaks National Monument, the Ashdown Gorge Wilderness, the Yankee Meadows Reservoir area, the Navajo Lake area, Duck Creek area, and Panguitch Lake area, attract many recreation visitors. Utah State Highways 143, 148, and 14 are frequently chosen as scenic travel routes by visitors touring southern Utah including the Bryce Zone, and Capitol Reef National Parks, and the Escalante Grand Staircase National Monument. The National Parks and Monuments attract national and international visitation to the Cedar City Ranger District.

Recreation activities include: viewing scenery, watching wildlife, motorcycle, and ATV riding, mountain biking, horseback riding, camping, hunting, snowmobiling across country, cross country skiing, hiking, fishing and boating. Recreation use on the Cedar City Ranger District has steadily increased, especially from residents of Las Vegas, Nevada, St. George, Utah, Phoenix, Arizona, and southern California. Fifty percent of Clark County Nevada (Las Vegas area) residents surveyed in a 1994 random telephone survey indicated that they had visited the Dixie National Forest in the last two years (A & A 1994). Clark County is currently the fastest growing metropolitan area in the country. There are many international visitors to Cedar Breaks National Monument, which is located in the spruce zone of the Markagunt Plateau.

RECREATION ACCESS ROADS WITHIN THE SERP ANALYSIS AREAS

UTAH STATE HIGHWAYS 143, 148, AND 14

Primary travel routes within the Spruce Ecosystem Recovery Project include Utah State Highways 14, 143, and 148. All three highways have been designated Utah State Scenic Byways and National Forest Scenic Byways.

Highway 143 is a primary access route for Cedar Breaks National Monument, Brian Head Peak, Brian Head Town, and Ski Resort, and Panguitch Lake. In 1993, Utah Department of Transportation (UDOT) estimates that 567,500 vehicles traveled the section of Highway 143 which crosses through the project area. This is an 8% increase over the 1991 estimate of 525,000 vehicles. UDOT records available in the Project File, exhibit 20, Traffic counts at the north boundary of Cedar Breaks National Monument on Highway 143 recorded 237,643 vehicles between June and October. No data was available for November or December. (Based on Traffic Counter Survey.) Because of the Park Service removes these counters during the winter months, the 1994 survey conducted by the National Park Service, found that there are an average of 2.35 persons per vehicle visiting Cedar Breaks. Applying this multiplier factor to UDOT’s estimates, there are approximately 1,300,000 people annually traveling along Highway 143 through the analysis area.

Utah State Highway 14 passes through the southern analysis area, and approximately 10 miles is included in the project Focus Area. Highway 14 provided access to Navajo Lake, Cedar Breaks National Monument, Duck Creek Campground, and Visitor Center, and Duck Creek Village. Data from a permanent traffic recorder on Highway 14 east of Cedar City recorded 669,729 vehicles traveling Highway 14 east in 1994. This is an 11% increase over the #29147 recorded in 1993. Approximately 1,644,000 people traveled along Highway 14 through the analysis area, using the Cedar Breaks factor of 2.35 persons per vehicle. The primary use is during June through October as illustrated in the table below.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>1993</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>16,182</td>
<td>22,072</td>
</tr>
<tr>
<td>February</td>
<td>26,068</td>
<td>24,696</td>
</tr>
<tr>
<td>March</td>
<td>22,475</td>
<td>26,381</td>
</tr>
<tr>
<td>April</td>
<td>27,450</td>
<td>31,680</td>
</tr>
<tr>
<td>May</td>
<td>46,903</td>
<td>56,761</td>
</tr>
<tr>
<td>June</td>
<td>73,650</td>
<td>73,170</td>
</tr>
<tr>
<td>July</td>
<td>114,806</td>
<td>120,683</td>
</tr>
<tr>
<td>August</td>
<td>102,610</td>
<td>112,716</td>
</tr>
<tr>
<td>September</td>
<td>81,930</td>
<td>92,550</td>
</tr>
<tr>
<td>October</td>
<td>61,845</td>
<td>78,988</td>
</tr>
<tr>
<td>November</td>
<td>30,720</td>
<td>33,030</td>
</tr>
<tr>
<td>December</td>
<td>24,428</td>
<td>27,001</td>
</tr>
<tr>
<td>Total</td>
<td>629,147</td>
<td>699,728</td>
</tr>
</tbody>
</table>

(1) Based on Boundary Traffic Counters on Highways 143 and 148.

Seasonal travel patterns are reflected by Cedar Breaks National Monument entrance vehicle counter trials, and data from a permanent traffic recorder on Highway 14 east of Cedar City. The Highway 14 counter pattern also do not represent the impacts of Brian Head Ski Resort, because Highway 148 is closed during the winter months. As a result, the winter traffic represents a higher percentage of the total traffic volume on Highway 143 than it does on Highway 14.

The Dry Lakes Road (#265) has been designated a Utah State Scenic Backway. The Dry Lakes Road (Forest Road #265) is the western boundary of the project area. This road is maintained by Iron County as an all weather gravel-
nature surface road, and is plowed by Iron County during winter months. Activities along this road include driving for pleasure, access for summer home areas on private land, access for hiking, mountain biking, snowmobiling, and cross-country skiing. This area is designated open to off road vehicle travel in the forest travel plan.

Other primary travel routes include Sydney Valley and the Center Creek Roads (#048), the Bowery Creek road to Yankee Meadow Reservoir (#049), Bear Flat Road (#044), Brian Head Peak Road (#047). Secondary travel routes include Radar Ridge (#277) Sage Valley Road (#200), and the Red Desert Road (#0051). The roads from the former Deer Valley Timber Sale are frequently used as ATV and motorcycle routes in the summer, and snowmobile routes in the winter. (See Appendix 91). These roads are all native or gravel surfaced roads.
There is a network of roads within the Brian Head Ski Resort permit boundary for servicing the lifts and snowmaking ponds and to provide access to runs for grooming. These roads are closed by the Dixie National Forest for all vehicles except as necessary for resort administration. These roads are used as trails by hikers and mountain bikers during summer and fall months. This use is promoted by Brian Head Town and Brian Head Ski Resort and this road system is considered part of the area trail network.

CAMPING
Camping is a popular recreation activity within the project. There are no developed campgrounds within the SERP analysis area. There is one developed picnic and campground within Cedar Breaks National Monument, which is located within the spruce zone of the Markagunt Plateau. The more popular dispersed camping sites include Upper Bear Flat, Yankee Meadows Reservoir (adjacent to SERP analysis boundary), Long Valley, Deer Valley, Red Desert and Sage Valley. Dispersed camping is permitted adjacent to most roads within the analysis area. There is moderate to heavy dispersed camping use throughout the summer. The Deer Valley, Red Desert and Sage Valley areas are especially popular for dispersed camping during the fall hunting season.

TRAIL USE
The SERP analysis area trails receive heavy to moderate use throughout the summer and fall season by bikers, mountain bikers, ATV and motorcycle riders, and horseback riders. Trail counters on the Virgin River Rim trail, on the southern edge of the project area recorded 2190 users in August 1995. Sydney Peaks trail counters recorded 7547 users from July through October 1995 and 16,483 users for the same period during 1996. This trail is frequently used to travel to the Barker Creek Trail, which is included in a Focus Areas.

Primary use trails in the analysis area include: Brian Head Town and Resort trails, Sydney Peaks and Lower Ponds trails, Left and Right Forks of Barker Creek trail, Virgin River Rim trail, and the Dark Hollow trails. These trails are among the busiest. Brian Head, Barker Creek and Dark Hollow trails have received regional and national attention in mountain biking and travel magazines. The primary trails for the Ashdown Gorge Wilderness begin in the analysis area, Blow Hard, Rattlesnake, High Mountain and Twisted Forest trails. There is a trail system in the Cedar Breaks National Monument, which is located within the spruce zone of the Markagunt Plateau. Secondary trails include the Hancock Peak, Hendrickson Lake, Navajo Point and Spring Creek trails. The Sydney Peaks and Sydney Creek paid trails currently have low use and most trails currently have other area trails, and offer users a semi-primitive non motorized experience, including opportunities for solitude and a sense of remoteness from others. The last mile - 1/2 mile of the Hancock Peak trail passes the Markagunt Lake sub-subsidence and the old Hancock Peak Cumberland Trail. In this area, the sense of solitude and remoteness from the sites and sounds of humans is greatly reduced. Only hiking and backpacking is permitted in the Ashdown Gorge Wilderness.

MOUNTAIN BIKING
Mountain biking has been steadily increasing within the project and adjacent areas. The Brian Head community and resort have been actively marketing to this user group by developing mountain bike trails and a permit area, and developing a trail network within the town. Two mountain bike festivals, in July and September, and a mountain bike competition in August and September, are mountain bike events that are operated under a special use permit with the Dixie National Forest. These festivals all cross the analysis area. The Utah Summer Games also sponsor races within the analysis area during June. Thirty one percent of the 4420 summer lift riders are mountain bike riders. There are two businesses in Brian Head that operate shuttle services for mountain bikers. Brian Head Resort has a permit to shuttle 996 people during 1994. The Barker Creek/Sydney Peaks trails received the most use, with 582 people being shuttled from the Spring Creek trailhead and a total of 1433 people shuttled by the terminus in the Sierra Nevada. This use is maintained by the Snowmass West Rim Trail, from the terminus in Parowan. Five businesses in Brian Head rent and sell mountain bike equipment. Brian Head Cross Country reports a 400% increase in mountain bike rentals, from 260 in 1993 to 1062 in 1994.

ATV and MOTORCYCLE USE
ATVs and road motorcyles are used on many of the primary and secondary native and gravel surface roads. Within the project area, ATV trails include the Stahig Valley and the Center Creek Roads (off Red Rock Park Road and the Center Creek road to the Yankee Meadow Reservoir (649), Bear Flat Road #004, Brian Head Peak Road #047, Sage Valley Road #240, and the Red Desert Road #051). The roads constructed for the former Deer Valley, Blushowd, Sage Valley, Hancock and Lower State timber sales are frequently used for ATV and motorcycle travel. Off road motorized vehicle travel is prohibited throughout the analysis area.

BRIAN HEAD SKI RESORT
A portion of the Brian Head Ski Resort is under special use permit with the Dixie National Forest. All of the 405 acres within the permit area are within the project area. The resort operates 7 lifts and 53 runs. During the 1996-97 ski season 134,859 skier days were recorded. Use has been relatively stable since 1996; averaging 150,000 skiers per season. The Brian Head Resort has proposed an expansion which includes the construction of three new lifts and associated runs on US Forest Service System Lands. This expansion is proposed to support up to 250,000 skier days per season (USDA 1997). A decision was made in August, 1997 to implement the proposal.

The resort has extended their lift operation into the summer and fall seasons to accommodate mountain bikers and sightseers by operating Giant Steps Chair Lift #2. In 1994 there were 1455 tickets sold to mountain bike users, and 3167 sightseers and hikers used the lifts. This is a 38% increase over the use in 1993 (the first year the lifts were operated during the summer).

<table>
<thead>
<tr>
<th>Table 3-10. Summer Lift Use - 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAY</strong></td>
</tr>
<tr>
<td>Mountain Bikes</td>
</tr>
<tr>
<td>Sightseers</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

There is lodging available as part of the resort development in Brian Head Town. The Cedar Breaks Lodge receives the highest use during the ski season (December to March) and the summer season (July and August). The bus tours account for a significant portion of the summer use.

WINTER RECREATION USE
Snowmobiling is another primary winter recreation activity within the project area. A snowmobile route has been proposed that will be groomed by Utah State Parks and Recreation, linking the Brian Head area with the Parowan Lake area and Duck Creek systems. Utah State Park #4 and Recreation grooming trails along the Red Desert (501) and Sage Valley (240) roads. Midway Valley trail (the 14-133 junction) is a major snowmobile trailhead. There is also a major snowmobile trailhead at the Navajo Lake junction south-east of the analysis area. There is also cross-country skiing, with designated trails located in the Brian Head area. Highway 148, which is closed during the winter, is a popular snowmobile and cross-country skiing travel route.

BRIAN HEAD TOWN
There are 130 permanent residents living within the city limits of the Brian Head. There are 70 developed lots within the city limits. However, there are many vacation homes built within Brian Head Town and nearby subdivisions and private lots. According to Iron County property ownership records, there are 600 private land owners in or near the Brian Head Town. Many of these lots have not yet been developed.

The primary industry for Brian Head Town is tourist related service industries. In addition to the services provided by the resort there are 7 lodging accommodations consisting of hotels and condo/motel rentals. There are also 4 restaurants and 5 sporting good shops that rent and sell and skiing and mountain biking equipment.

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Vistation has been increasing during the summer and fall months. The quarterly resort and sales tax collection reported by Brian Head Town for June-November has increased by 56.7% between 1996 and 1998. The community has been actively promoting summer vistation through sponsorship of recreational events and festivals.

SECONDARY RESIDENCES

There are secondary recreation residences on private lands in the Rainbow Meadows Ranches, Ireland Estates, and Meadow Lake Subdivisions, and areas adjacent to Brian Head Town. A few of the homes in these areas are used as primary residences.

BRIAN HEAD PEAK

Brian Head Peak is the second highest point on the Dixie National Forest at 11,307 feet. A gravel road provides access to an overlook at the top, providing scenic vistas hundreds of miles in every direction. A rock lookout structure was constructed during the 1930s by the Civilian Conservation Corps (CCC). There is heavy vistation during the summer. Use is moderate to light during the fall and winter, with the only winter access being on snowmobiles or skis. The Brian Head Ski Resort operates a snowcat during the winter to transport advanced skiers to Brian Head Peak for skiing the chutes on the north face of the peak. A chair lift is being proposed by Brian Head Ski Resort that would provide additional winter and possibly summer access to the top of the peak.

HUNTING AND FISHING

Hunting and fishing are popular recreation activities throughout the project area. Popular fishing sites include: Yankee Meadows Reservoir and Navajo Lake, both of which are outside of the SERP boundary, but adjacent to it. There is also fishing in the Lower Creek and Ponds, Mammoth Creek, Banker Creek, and Castle Creek.

The area receives concentrated use during the general season deer and elk hunts. Blue grouse are hunted along the rim areas.

RECREATION OPPORTUNITY SPECTRUM CLASSIFICATION AND FOREST PLAN DIRECTION

The analysis area is managed to provide for rural, roaded natural, semi-primitive non-motorized, and semi-primitive motorized, based on the Recreation Opportunity Spectrum classification as described in USDA Forest Service R05 Book 1990. See complete discussion in "Effects of Spruce Beetle Epidemics and Silvicultural Treatments on Scenic and Recreation Resources." Scenic and Recreation Resources.

CUMULATIVE EFFECTS AREA

The recreation CEA of recreational features is tied to Highway 143, 148, and 14 including Cedar Breaks National Monument, Paria and Navajo Lakes, Ashdown Gorge Wilderness and Duck Creek Campground and Village. It extends south to the Cedar City Ranger District boundary, north to Parowan, east to Paria, and west to Cedar City. See map. Appendix 1B.

Yankee Meadows Reservoir is located adjacent to the northern boundary of the analysis area. This reservoir is popular for boating, fishing, and dispersed camping. Navajo Lake, located less than a mile south of the analysis area boundary, is also popular for boating and fishing. There are three developed campgrounds in the Navajo Lake basin: Spruces, Er Ah, and Navajo Lake, and a special use permit recreation facilities, include lodging and boat landings, Duck Creek Village and the Forest Service's Duck Creek Campground are located east of the analysis area on Highway 143. Paria Lake is included, due to mountain hiking and hiking trails that originate on the Brian Head area and pass through or terminate in the Paria Lake vicinity. There are also people who pass through the analysis area while travelling on Highway 143 to Paria and Paria Lake. Cedar Breaks National Monument is a popular scenic area. Tourists will often visit the area while on route between Zion and Bryce National Parks, and the Escalante Grand Staircase National Monument.

SCENIC RESOURCES

NATIONAL FOREST SCENERY MANAGEMENT SYSTEM

The National Forest Scenery Management System is the process used for planning and design of the visual elements of multiple use land management. Scenery management is based on the criteria and guidelines in the Landscape Aesthetics Handbook for Scenery Management, USDA Handbook Number 701. This system was implemented in 1996, superseding the Visual Management System and replacing National Forest Landscape Management, Vol. 2, USDA Handbook Number 462.

The eleven fundamental principles to the Scenery Management System are:

- Biological, physical and social factors create and influence scenery and interact to determine landscape character.
- Landscape character varies greatly with the interaction of environmental factors.
- People have the ability to perceive landscape character and develop expected images.
- Through various activities, people have the ability to modify landscape character and scenic conditions and have often done so.
- Such changes in landscape character and scenic condition often modify, suppress, or replace the original landscape character.
- People value most highly the more scenic landscapes.
- Generally, natural appearing landscapes are the most valued.
- Resource managers can design their activities to reduce adverse impacts on landscape character and scenic integrity.
- People have the ability to establish goals to maintain or create desired landscape character.
- People have the ability to apply ecological, technical, and design knowledge to meet scenery management goals and objectives.
- In some situations, resource managers perpetuate or create desired scenic environments to provide an improved quality of life (USDA 1995).

The Scenery Management System (SMS) began with the basic premises established in the Visual Management System, and has been expanded to better accommodate ecosystem management and the time frames of natural systems. This system also places greater importance on establishing which scenic elements forest constituency most value, and identifying ways to maintain or improve on these qualities.

The terminology introduced in the SMS will be used in this analysis. The Forest Plan-Specified Visual Quality Objectives (VQOs) from the Visual Management System associated with the Management Areas. SMS uses Scenic Integrity Objectives to establish the desired condition for management of an area instead of VQOs. A crosswalk is described in the 'Landscape Aesthetics: A Handbook for Scenery Management (USDA 1994)'. An inventory is currently taking place to review the VMS-SMS transition on the Dixie National Forest. Until that inventory and review process is complete, the crosswalk is being used to apply the SMS system with Scenic Integrity Objectives to Visual Quality Objectives specified in the Forest Plan.

Scenic Integrity is defined as "a measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character
Table 3-11. Comparison of Visual Scenic and Scenesc Manager Systems Objectives

<table>
<thead>
<tr>
<th>VISUAL QUALITY OBJECTIVE</th>
<th>SCENIC INTEGRITY OBJECTIVE</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td>Preservation</td>
<td>Underlined: Valued landscape character is intact with only minute if any deviations. The existing landscape character and sense of place is expressed at the highest possible level.</td>
</tr>
<tr>
<td>Retention</td>
<td></td>
<td>Appears underlined: Landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, texture, tone, color, and pattern common to the landscape character so completely and at such a scale that they are not evident.</td>
</tr>
<tr>
<td>Partial Retention</td>
<td>Moderate</td>
<td>Appears Slightly Altered: Noticeable deviations may remain visually subordinate to the landscape character being viewed.</td>
</tr>
<tr>
<td>Modification</td>
<td>Low</td>
<td>Appears Moderately Altered: Deviations begin to dominate the valued landscape character being viewed but key borrowed valued attributes such as size, shape, edge effect and pattern of natural openings, vegetation type changes or architectural styles outside of the landscape being viewed.</td>
</tr>
<tr>
<td>Maximum Modification</td>
<td>Very Low</td>
<td>Appears Heavily Altered: Deviations may strongly dominate the valued landscape character.</td>
</tr>
</tbody>
</table>

LANDSCAPE CHARACTER

The spine for forest on the Cedar City Ranger District is found within the Southern Markagunt- Pauaunagut Plateaus and Northern Markagunt Plateau Subsections (Nelson 1994). The Southern Plateau Spines Subsection can be seen from many vista points within the spine for forest. These designations are part of the National Hierarchical Framework of Ecological Units. Ecological units are used for ecosystem planning and management. These units are delineated by the spatial distribution of natural associations of dominant ecological factors that affect the structural and functional attributes of ecosystems.

SOUTHERN MARKAGUNT-PAUANAGUT PLATEAU SUBSECTIONS

The landscape of the Southern Markagunt Pauaunagut Plateaus is made up of limestone tablelands and cliffs at the southern end of the two large plateaus (Nelson 1994). The plateaus are relatively flat surfaces bounded by sheer walls, slopes, depressions, and buttes of large dimensions, benches at various levels, and sculptural small-scale erosional forms. The landform is a broad plateau surface with broad, shallow drainage ways. The pink, white, and orange-bluish cliffs of Claron limestone formation line the southern margin, such as found at Cedar Breaks National Monument. Gregory (1990) describes the cliffs as "the Pink Cliffs are brightly colored high walls, marvelously decorated with carving, the glory of all rock work."

NORTHERN MARKAGUNT PLATEAU

The landform of the Northern Markagunt Plateau is rolling hills that are of volcanic origin on a northward sloping plateau surface (Nelson 1994). Brian Head Peak is the most prominent point in this subsection, with volcanic ridges running to rounded volcanic cones and glacial moraines expressed as undulating forms in the drainage ways. To the south the plateau is bounded by the pink cliffs of the Claron formation. To the north the Black Ledge (which forms the Sydmore Peaks) bounds the northwestern edge of the plateau.

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Cedar City Ranger District Dixie National Forest

AFFECTED ENVIRONMENT

LANDSCAPE CHARACTER ELEMENTS COMMON TO BOTH SUBSECTIONS

The Markagunt plateau surface is characterized by gentle slopes, slow running streams, and the absence of conspicuous cliffs and canyons (Gregory 1950). The plateau surface is accentuated by volcanic cones and dark, rugged boulder fields of lava streams. The ridges are covered with spruce fir, aspen, and mixed conifer to the west, and ponderosa pine on the lower elevation eastern slopes. Meadows of wheatgrass-bluegrass wind along drainage ways across the plateau surface. Most of the spine is in mature to old age stands with few beginning the winter season in aspen stands distanced from light green of summer, the brilliant gold of fall, and the grey of winter. Patches of open park-like meadows also add to the contrasts, with golden grasses through most of the summer and fall. The spruce fir forests are relatively open. Mature trees grow in clumps, with a cathedral type canopy, allowing shafts of light to reach the forest floor. Aspen are more evenly distributed, with lacy canopies, and a grass covered forest floor.

The viewer perceives a predominantly natural appearing landscape with some evidence of human modification and disturbance. Before the current beetle infestations natural disturbances had a moderate influence on the vegetation patterns. These disturbances include fire, storm, insect and disease events and recovery processes from these events. The last major disturbance from insect infestation of the spruce for forest, and may have resulted in the loss of most of the older age class of trees. Fire disturbance plays a minor role in the landscape patterns in the spine for forest. In the aspen forests in the project area little fire disturbance is evident that occurred in the last 100 years. Since it is a disturbance dependant species, this is resulting in a reduction of the representation of aspen (Eisenhauer and McGinn 1997).

The Markagunt Plateau has been used by people for thousands of years, as evidenced by Native American artifacts that have been found across the plateau. The character of land use changed on the Markagunt Plateau in the late 1850s when Cedar City and Parowan were first settled by Mormon pioneers. The vegetation patterns of the plateau have been altered by timber harvest and sheep and cattle grazing. Recreation use and vacation homes have become important uses of the landscape during this century. Roads and trails built to accommodate timber harvest, grazing, and recreation use, are evident across the landscape. Other developments include vacation home developments on private lands located within the National Forest Boundary, and recreation developments such as Nasara Lake, Duck Creek, and Cedar Breaks National Monument. The landscape surrounding Brian Head Town, Brian Head Ski Resort and Duck Creek Village has a rural character. Where road corridors, ski runs and structures are apparent.

The landscape of the spine for forest is highly valued for its scenic quality. This is expressed in the high recreation use, the establishment of the Brian Head Ski Resort and Town, Ashdown Gorge Wilderness, and Cedar Breaks National Monument.

THE LANDSCAPE CHARACTER AND SCENIC INTEGRITY LEVELS OF THE SERP FOCUS AREAS

The landscape of the SERP area is highly valued for its scenic quality as expressed in the high recreation use. The establishment of the Brian Head Ski Resort and Town, Ashdown Gorge Wilderness, and Cedar Breaks National Monument. Utah State Highways 143, 148, and 14 have been designated Utah State and National Forest Scenic Byways. These highways are promoted as scenic routes to Bryce, Zion and Capitol Reef National Parks, and the Grand Staircase of the Escalante National Monument. The Dry Lakes Road (# 285) is a designated Scenic Byway. Most of the visitors to this area have a high expectation for quality scenery.

HANCOCK PEAK FOCUS AREA

Within this Focus Area, the landscape is dominated by spruce fir and aspen cover, with a few patchy small meadows. While spruce mortality is present, the evident beetle killed spruce are viable only in small patches, and individual trees. This Focus Area is predominantly natural appearing. Evidence of past logging activities such as roads, stump, and deterrent slash might be visible in the past 75-100 years. The flora within the Focus Area are classified as Class B, common within this subsection. The roads within the Focus Area were constructed for past logging activities and it is expected that few visitors travel these roads for their scenic quality. Therefore, these roads are Concern Level 3 roads.

This Focus Area is viewed from Highway 143, a Concern Level 1 travel way, and Rainbow Meadows and Meadow Lakes Subdivisions, Concern Level 1 areas. Hancock Peak, a prominent forested forested conifer can be seen as foreground to middleground from many points along Highways 143, 148 and 14. The Focus Area is located on the

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AFFECTED ENVIRONMENT
Steam Engine Focus Area

The landscape of this Focus Area is dominated by a mature spruce forest that provide a cathedral like canopy interspersed with grass-Fors covered meadows. Beetle killed spruce are evident within this Focus Area and becoming dominant. A small stand of the Bunker Creek riparian area that is adjacent to this Focus Area. Beetle killed spruce are beginning to dominate the view in some areas within this Focus Area and adjacent to it. The spruce/forest in this Focus Area is predominantly natural appearing, with evidence of past logging activity that removal much of the mature overstory. The Focus Area is naturally appearing, with evidence of past logging activity in the immediate foreground in some areas. Evidence of past logging activities includes roads, stumps and detritus. Views within this Focus Area are Class B or common for this subsection. Views of the Bunker Creek riparian area are Class A (dissorative) for this subsection.

The roads that are within this Focus Area were constructed for past logging activities. These roads receive low use, and are Concern Level 3 roads. The Left-hand Fork of Bunker Creek trail passes near the boundary of this Focus Area. This trail is a Concern Level 1 trailway because of the high use and visitors have a high expectation for quality scenery. This trail has received regional and national attention in magazine articles and trail guides. The 381 acres of this Focus Area are all included in Management Area 1.

Deer Creek Focus Area

Within this Focus Area, the landscape is dominated by spruce/forest and aspen cover, with views of grassy meadows along the Deer Creek riparian areas within and adjacent to this Focus Area. Spruce mortality is present but the evidence beetle-killed spruce are still visible as small patches and individual trees. The stands are pure aspen are mature, with a high lacy canopy and a grasse forest floor. Other stands have an encroaching spruce/forest understory. Because streams are relatively rare on the plateau surface, Deer Creek is a distinctive scenic element in the landscape. The Focus Area is predominantly natural appearing. Views within this Focus Area are Class B or common for this subsection. The current Scenic Integrity Level is high. No primary travelways occur within this Focus Area. Several primitive four wheel drive roads are in this Focus Area. They are Concern Level 3 because of relatively low use. Small portions of the northern most part of this Focus Area may be visible within the foreground of the Bunker Creek trail. This is a Concern Level 1 travel way. The 772 acres of this Focus Area are all included in Management Area 1.

Chicken Head Focus Area

This Focus Area is dominated by mature spruce/forest at higher elevations and aspen with some spruce/forest encroach- ment. The Focus Area is primarily natural appearing. The current Scenic Integrity Level is high to very high. There is a significant population of human development or management activities within this Focus Area and the Beetle killed spruce have not yet began to dominate the view. However, within one year the spruce killed by the beetle will begin to fade, dominating the landscape and reducing the Scenic Integrity Level.

No primary travelways cross through this Focus Area. The Dark Hollow Trail follows along the boundary for this Focus Area. The Dark Hollow trail is a Concern Level 1 trail because of the high use and high expectation of quality scenery by the users. Forest road 6084 follows the eastern boundary of this Focus Area. Forest road 6084 links the site of the Dark Hollow and the Bunker Creek Focus Area. The entrance to the Vermillion Castle and Dark Hollow areas, and overlook Yankee Meadows Reservoir. This 801 acres of Focus Area are in all of Management Area 1.

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Lower State Focus Area

Within this Focus Area, the landscape is dominated by spruce/forest and aspen cover, with views of long grassy meadows within and adjacent to this Focus Area. Beetle mortality is present, currently the evident beetle killed spruce are visible in small patches and individual trees. Beetle killed spruce do not yet dominate the view. The spruce/forest in this area tends to be younger appearing, lacking the "cathedral" like quality because of past logging activity that removed more the mature overstory. It is dominated by smaller spruce. Views from the Focus Area overlook stands where spruce mortality is more dominant. Loder and Castle Creeks both flow through this area. These streams are relatively rare on the plateau surface, they become distinctive scenic elements in the landscape. The Focus Area is predominantly natural appearing, with evidence of past logging activity in the immediate foreground in some areas. Evidence of past logging activities includes roads, stumps and detritus. Views within this Focus Area are Class B or common for this subsection. The 662 acres of this Focus Area are Class B or common for this subsection. The views of this Focus Area are within the Winfield and Sanbuck Forests.

Within this Focus Area 110, 219 acres in Management Area 1 (g-ral direction.) 122 acres in Management Area 2B (g-ral direction.). The aspen regeneration prescribed burns, stands 1 and 2 are the only parts of this Focus Area on the Management Area 2B. The most critical views are those from Highway 143 and the Sanbuck Valley Road. Scenic Integrity Level is High within the foreground of Highway 143 and the Sanbuck Valley Road.

Spruce Focus Area

The landscape of this Focus Area is dominated by dense ancient spruce that provide a cathedral like canopy, and aspen with a mature canopy understory. Much of the spruce is infested with spruce bark beetle; but evidence of the mortality does not yet dominate the view. The landscape within this Focus Area is Natural Evolving. The landscape within this Focus Area is typical of this subsection. The current Scenic Integrity Level is high to very high. There is significant human development or management activities within this Focus Area and the Beetle killed spruce have not yet began to dominate the view. However, within one year the spruce killed by the beetle will begin to fade, dominating the landscape and reducing the Scenic Integrity Level.

The only travelways through this Focus Area are the Spruce Trail, a Concern Level 2 trail. This is a Concern Level 2 trail because while the visitors to this trail have a high concern for scenic quality, there is relatively low use compared with other trails, such as the Bunker Creek or Dark Hollow trails. This trail offers intermittent views to the Spruce Trail. The Beech Kill is a typical of this subsection. The current Scenic Integrity Level is high to very high. There is significant human development or management activities within this Focus Area and the Beetle killed spruce have not yet began to dominate the view. However, within one year the spruce killed by the beetle will begin to fade, reducing the Scenic Integrity Level.

No primary travelways cross through this Focus Area. The Dark Hollow Trail follows along the boundary for this Focus Area. The Dark Hollow trail is a Concern Level 1 trail because of the high use and high expectation of quality scenery by the users. Forest road 6084 follows the eastern boundary of this Focus Area. Forest road 6084 links the site of the Dark Hollow and the Bunker Creek Focus Area. The entrance to the Vermillion Castle and Dark Hollow areas, and overlook Yankee Meadows Reservoir. This 801 acres of Focus Area are in all of Management Area 1.
that is Class A (basement). The slopes of spruce and aspen are an important visual element lending to the contrast with the red cliffs of the Vermillion Castle area, and Yankee Meadows reservoir. This Focus Area contains about 700 acres in Management Area 1 and 400 acres in Management Area 6A (livestock grazing).

ROADLESS AREA FOCUS AREA

The landscape of this Focus Area is characterized by a relatively flat bench covered by spruce/fir and aspen stands, with troughs of lava beds sticking throughout. The aspen has a spruce/fir understory in many areas. The dark, rugged lava fields are a distinct visual feature, providing most of the topographic relief of this Focus Area. This is a natural evolving landscape. This Focus Area is Class B or common for this subsection. The Scenic Integrity Level for this area is High.

Because of the flat character of the terrain in this area, this Focus Area is not viewed from any primary travelways. Views of this Focus Area may be seen from the Ranger Ridge road (#277) a Concern Level 2 road. This Focus Area may also be viewed from the Red Desert Road (#220), a Concern Level 2 road, but they are limited because of the screening from extensive lava fields in the area. The only travelway through this area is the Hancock Peak Trail. This trail is a Concern Level 2 trail because of the relatively low use where visitors have a high expectation of quality service and scenic views to the Meadow Lake subdivision. The 2,792 acres of this Focus Area are primarily in Management Area 2A.

CUMULATIVE EFFECTS MATRIX

The scenic resource CEA is tied to the Spruce Ecosystem Recovery area analysis boundary. This includes Highways 14, 143, and 148 where they pass through the SERP analysis area. Yankee Meadows Reservoir area is also within the CEA because of its adjacency the SERP boundary and views of the Chicken Head Focus Area. (See the NPS Spruce Ecosystem CE A Map Appendix 140).

Yankee Meadows Reservoir is popular for boating, fishing and dispersed camping. Cedar Breaks National Monument is a popular scenic area. Tourists will often visit the area while en route between Zion and Bryce Canyon National Parks, and the Escalante Grand Staircase National Monument.

SOILS

EROSION PROCESSES

The Forest Plan objective for the forests associated with the SERP area is to maintain or improve long term soil productivity and soil hydrologic function. As previously described in step 1 of the watershed assessment (Project File, exhibit 14), soil quality standards have been established which set thresholds for the parameters which affect long term soil productivity and soil hydrologic function.

A soil resource inventory is currently underway for the Dixie National Forest. Field mapping has been completed for the entire forest. The inventory identifies the physical and chemical properties of the soils that occur on the Forest. Interpretations are being developed that identify limitations and limitations of these soils for a variety of management uses.

The watersheds/subwatersheds associated with the SERP area include Upper Asay, Upper Mammoth, Center, Parowan, Rangebird Lake, Summit Creek, North Fork Virgin and Coal Creek. The following discussion concerning current condition of the soil resource relative to long term soil productivity and soil hydrologic function pertains just to the portions of the subwatersheds that occur within the SERP area. This is because long term soil productivity and soil hydrologic function are site specific characteristics. It is not affected by what occurs on adjacent areas, nor does it impact adjacent areas. The effects of sediment on water quality and fisheries habitat are discussed in other sections of this document.

The dominant uses/land allocations on these watersheds that impact the soil resource are livestock grazing and timber harvest.

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The kinds of adverse impacts to the soil resource associated with livestock grazing on rangeland portions of the watersheds include reduced ground cover, soil displacement, compaction and puddling. Allotment Management Plans (AMP's) have been established for all allotments within the watersheds which limit livestock numbers and season of use and establish proper use guidelines. When implemented correctly, the AMP and proper use guidelines result in maintenance of long term soil productivity.

Monitoring is used to determine when proper use has been reached and when livestock need to be moved to the next pasture or removed from the allotment. This monitoring is used to continually assess whether livestock numbers or season of use needs to be adjusted.

Riparian areas receive the same types of grazing impacts (reduced ground cover, compaction, displacement, puddling) as do the uplands, but due to the abundance of preferred forage species and the presence of water, livestock use and their impacts are concentrated. Proper use guidelines are exceeded more often in the riparian areas than on the uplands.

Adverse impacts to the soil resource associated with timber harvest (including road construction) include compaction, displacement, puddling, reduced ground cover/canopy cover, reduced amounts of coarse woody debris, and severe burning (associated with fuels management).

Best Management Practices (BMP's) are recommended and implemented for all timber sales to ensure that the adverse impacts associated with timber harvest are within soil quality guidelines.

Monitoring is done to ensure that the BMP's are implemented and to assess whether they are effective. Monitoring over the last 20 years has identified problem areas which resulted in implementing additional kinds of BMP's to protect the soil and water resources. The current suite of BMP's used on Dixie NF timber sales appear to be resulting in maintenance of long term soil productivity. Monitoring will continue and when tools are identified additional BMP's will be formulated to ensure that soil quality guidelines will be met.

Other land uses that occur within the SERP area include highways, roads and trails; special use areas such as electronic sites, power line corridors, ski areas, gravel pits, etc. which take part of the National Forest land base out of production. Most of these land uses are not retrievable resource commitments - the productivity is lost while the land is allocated to another use, however the land could be returned to production.

Other land uses do not take NF land out of production or nor do they have a significant impact on the soil resource. These includes such uses as dispersed recreation, hunting, hiking, cross country skiing, etc.

The previous discussion applies to each of the x-y watersheds that the SERP Area occurs in. The following discussion describes current conditions that are specific to each of the watersheds.

UPPER ASAY SUBWATERSHED

This watershed occurs on the southwest portion of the Markagunt Plateau. Geology is dominated by Wasaatch limestone on the southern portion of the subwatershed and by Tertiary volcanic rocks and Quaternary basalt in the remainder of the area. Due primarily to the gentle slopes of this watershed, soil erosion rates are relatively low.

Recent monitoring has shown that there are upland rangeland areas adjacent to Cedar Breaks National Monument that were previously tall forb habitat types. The overgrazing that occurred in the late 1980's appears to have been severe that the productivity of these sites were compromised to the point that they may never recover (loss of long term soil productivity). Proposals have been suggested to test whether or not these tall forb sites can be restored.

UPPER MAMMOTH SUBWATERSHED

This watershed occurs on the western rim of the Markagunt Plateau and includes the lim注销 ute north of Cedar Breaks National Monument. Other prominent features of this watershed are Brian Head Peak, Sedgley Peak, Hancock Peak, Sedgley Valley and Red Desert. The dominant geology of the watershed is Tertiary volcanic rocks, but there are extensive areas of Quaternary basalt flows in the southern part.

This watershed also has areas of degraded tall forl sites discussed above in the Upper Asay subwatershed. These sites occur east of Cedar Breaks and north to the slopes of Brian Head Peak.
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Portions of Briar Peak and the Sidney Peaks areas have areas of highly erodable soils (soil map unit 239) which require special management considerations.

This subwatershed has a significant amount ofuvic soils (wetlands) in the vicinity of Sidney Valley, Rambow meadows have J. J. Hat and Reeds Valley. Some of these areas have gully systems that have worked their way up to or through the wetlands. These areas are at risk and have been identified as needing rehabilitation.

PANGUITCHE LAKE SUBWATERSHED

This subwatershed occurs on a portion of the Markagunt Plateau dissected by Banker Creek and Deer Creek. Geology is dominated by Tertiary volcanic rocks. There are some steep slopes associated with the major stream depressions. There are riparian areas associated with the Right and Left Forks of Banker Creek as well as Deer Creek. Deer Creek once had a series of beaver ponds which have been blown out or were blown out some time ago which resulted in some downcutting of the channel. There is some potential for watershed rehabilitation work on portions of this stream to improve riparian conditions.

The diversion of Castle Creek from the Mammoth Creek watershed into Deer Creek in the Panguitche Lake subwatershed created a large gully that contributed large amounts of sediment to the Deer Creek stream system. This gully continues to be a source of sediment.

PAROWAN WATERSHED

This area includes portions of the Parowan Creek and Center Creek subwatersheds. The portion of these subwatersheds that occur in the SERP area occupies the western escarpment of the Markagunt Plateau. Geology is dominated by Tertiary volcanic rocks. This landscape is an old slump-and-consisting of escarpment face with the hummocks landslide topography below. Several small ponds occur on this landscape below the cliff escarpment. Many of the areas that were once ponds have filled in and are now riparian areas. This landscape appears to be quite stable at this time except for the cliff escarpment which has areas of active rock fall.

The town of Brian Head and the Brian Head Ski Resort are located on this landscape. Portions of the Brian Head areas have experienced severe erosion losses in the past due to a variety of reasons. Recently, watershed rehabilitation measures have been implemented on the most critical areas. This watershed rehabilitation has consisted of structural measures such as rock-filled jetties as well as seeding, reseeding roads and improving drainage, and closing of unneeded roads as well as better traffic management (prohibiting vehicles from driving off roads on skylanes). Additional rehabilitation is needed on portions of the skylane on National Forest lands as well as on private lands.

The main concerns with this portion of the SERP area is locating roads to avoid intercepting water on road cuts which could tend to reestablish slump and mass wasting.

SUMMIT SUBWATERSHED

Only a small portion of this watershed occurs in the SERP area. The portion of this subwatershed that occurs within the SERP Project Area occurs in the vicinity of Navajo Ridge. Geology is dominated by Tertiary volcanic rocks with some influence from limestone of the Wasatch Formation.

COAL CREEK WATERSHED

Only a small portion of this watershed occurs in the SERP area. It occurs on the rim of Cedar Breaks National Monument and on the slopes of Bluffhead Mountain. Geology is dominated by limestone of the Wasatch Formation.

The Coal Creek watershed produces a high level of sediment, primarily in the spring from snow melt and in the fall from intense short duration thunderstorms. Most of the sediment comes from the barnes end of the Coal Creek accumulation in Cedar Breaks below the portion of the watershed within the SERP area.

NORTH FORK VIRGIN WATERSHED

Only a very small portion of this watershed occurs within the SERP area. The area involved occurs on the rim of the Markagunt Plateau near Gooseberry Point in the vicinity of the Deer Valley area. Geology is dominated by limestone of the Wasatch Formation.

SUMMARY

The dominant erosion processes prevalent in the SERP area are sheet and rill erosion on the uplands and stream bank erosion along drainages.

The soil resource inventory identifies all the soil map units that occur within the SERP Project Area. Each soil component is given an inherent soil erosion rating based on physical, soil characteristics and slope. Most of the SERP area occurs on relatively gentle slopes of the Markagunt Plateau and erosion hazard is low. Soils derived from limestone are generally more erosive than soils derived from volcanic rocks; however some volcanic derived soils such as soil map unit 239 are very erosive.

Mass wasting was a dominant factor in the formation of the landscape in the Parowan watershed on the slopes between Brian Head Ski Resort and Yankee Meadow Reservoir. The general landscape is now relatively stable. The only type of mass wasting currently occurring is rock fall associated with the cliff escarpment.

The trend of erosion processes on the SERP area is rated as stable. There are a few areas that have been identified, particularly in riparian areas, where it appears some type of rehabilitation needs to be implemented soon to avoid loss of productive wetland. The tall forbs that have been identified as degraded appear to be stable but at lower level of productivity than they were before degradation.

To ensure that long term soil productivity and soil hydrologic function are maintained, management options within the SERP area must consider soils rated as unsuitable forest land due to irreversible resource damage and steep slopes. Mitigation measures identified in white papers analyzing the effects of grazing and timber harvest on the soil resource must be identified and implemented on a project basis.

CUMULATIVE EFFECTS AREA

The CEA for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that the proposed management does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past as well as current management activities, the proposed activity, and foreseeable future management activities.

HYDROLOGY

This section of the report describes the affected environment in terms of hydrology, geology and geomorphology, channel morphology and riparian conditions. Water quality, and critical watershed areas. The Cumulative Effects Watersheds (CEWs) are also described.

HYDROLOGY

The Project Area lies on the western side of the Markagunt Plateau, and is in the headwaters of the following watersheds: Center Creek, Clear Creek, Blue Springs Creek, Mammoth Creek, Tommy Creek, and Midway Creek.

Precipitation on the Plateau occurs mainly in the form of snow between November and April. Summer rains occur in late spring and summer with heavy rain in July and August (Gregory 1950). Average annual precipitation on the plateau ranges between 30 and 40 inches with the highest values on the west side of the plateau. Because precipitation occurs mainly as snow, the annual peak flows are generally the result of spring snowmelt which occurs in April or May.

There are many areas within and adjacent to the project area that contain recent (Quaternary) basalt flows. These basalt flows are generally void of vegetation, and are important groundwater recharge zones. Shallow aquifers lie beneath and adjacent to these basalt flows. Sub-surface water flow moves rapidly in some areas through underground conduits formed by the basalt flows. An example is the rapid movement of water from Navajo Lake to Duck Creek, Cascade, and Aspy Springs. Shallow aquifers within the project area may also be important sources of water for these springs and others (Wilson and Thomas 1964).

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AFFECTED ENVIRONMENT

The dominant erosion processes prevalent in the SERP area are sheet and rill erosion on the uplands and stream bank erosion along drainages.

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The trend of erosion processes on the SERP area is rated as stable. There are a few areas that have been identified, particularly in riparian areas, where it appears some type of rehabilitation needs to be implemented soon to avoid loss of productive wetland. The tall forbs that have been identified as degraded appear to be stable but at lower level of productivity than they were before degradation.

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CUMULATIVE EFFECTS AREA

The CEA for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that the proposed management does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past as well as current management activities, the proposed activity, and foreseeable future management activities.

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HYDROLOGY

The Project Area lies on the western side of the Markagunt Plateau, and is in the headwaters of the following watersheds: Center Creek, Clear Creek, Blue Springs Creek, Mammoth Creek, Tommy Creek, and Midway Creek.

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There are many areas within and adjacent to the project area that contain recent (Quaternary) basalt flows. These basalt flows are generally void of vegetation, and are important groundwater recharge zones. Shallow aquifers lie beneath and adjacent to these basalt flows. Sub-surface water flow moves rapidly in some areas through underground conduits formed by the basalt flows. An example is the rapid movement of water from Navajo Lake to Duck Creek, Cascade, and Aspy Springs. Shallow aquifers within the project area may also be important sources of water for these springs and others (Wilson and Thomas 1964).
GEOLGY AND GEOMORPHOLOGY

The surficial geology types within the project area consist of tertiary rhyolite and quaternary basalts, both of which are extrusive, volcanic rock types. On the north end of the project area, there are several areas where bentonite clay is exposed. The Wasatch Formation (Tertiary) lies beneath the volcanic rocks, and is exposed where the volcanic rocks are not present. The Wasatch Formation is pink sedimentary rock which is made up of limestones, sandstones, and conglomerates (Gregory 1999). Detailed descriptions of the soils and parent material within the Project Area are contained in the Soil section of this document.

The project area lies east of the escarpment of the Markagunt Plateau and does not contain areas of active headward erosion. The Plateau dips to the east approximately 1.5 degrees (Wilson and Thomas 1964). Mass wasting and hillside failures are rare within the project area because of the relatively gentle topography and stable parent material. However, there are some areas of mass failure associated with road construction. Many of these areas consist of bentonite clay. The dominant erosion processes within the project area consist of sheetwash, rill and gully erosion, and stream erosion. Rill and gully erosion is common in some of the meadows within the Project Area.

CHANNEL MORPHOLOGY AND RPIARIAN CONDITIONS

Channel morphology and riparian ecosystem data have been collected on the major streams that drain the Project Area (Castle Creek, Banker Creek, Deer Creek, Mammoth Creek, and Tommy Creek). This data is summarized in the Mammoth Creek and Panguitch Lake Watershed Analysis Reports. The raw data is available in the Level II riparian inventories, and the RI/R4 fish habitat inventories. All of these reports and documents are available in the Supervisor’s Office watershed files.

WATER QUALITY

The Utah State Division of Water Quality assigns beneficial uses to all waters within the State to protect them from controllable pollution (Utah Dept. of Environmental Quality 1994). The beneficial uses for waters within and downstream of the project area are listed below.

1C  Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Department of Health.
2B  Protected for secondary contact recreation such as boating, wading, or similar uses.
3A  Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
4A  Protected for agricultural uses including irrigation of crops and stock watering.

Aquatic macroinvertebrates were sampled in Castle Creek, Center Creek, Mammoth Creek, and Tommy Creek during the summer of 1999. These samples were sent to the National Aquatic Ecosystem Monitoring Center for analyses. The results of these analyses are summarized in Table 3-12. Water quality can be assessed by the presence of or proportion of pollution-tolerant taxa within a sample. The Biological Condition Index (BCI) is an index that describes the relative health of stream ecosystems, and describes the condition of the stream ecosystem relative to its potential. The BCI is expressed as a score between 0 and 100, and is an indicator of water quality. The lower BCI values for Mammoth Creek and Tommy Creek are most likely the result of sedimentation from the Mammoth Creek subdivision.

CRITICAL WATERSHED AREAS

The shallow aquifers described in the above hydrology section are susceptible to pollution through percolation of synthetic chemicals such as petroleum products. These shallow aquifers are shown on the critical watershed map.

Two snow survey sites, administered by the Natural Resources Conservation Service (NRCS), are within the project area. The Midway Valley site is located on the NE corner of section 26, Navajo Lake Quadrangle. The Castle Valley site is located on the SW corner of section 22, Panguitch Lake Quadrangle. There is also a site located near Yankee Meadows Reservoir that is adjacent to the Project Area. These snow survey sites are identified on the critical watershed map. None of the sites are located within or near the Focus Areas.

Streams, lakes, ponds, wetlands, and other wet areas (i.e., seeps, small ponds, springs, and wet meadows) have been identified using aerial photos and topographic maps. These areas are shown on the critical watershed map.

There are no 303(d) waters within the Project Area. However, Panguitch Lake and Yankee Meadows Reservoir are on the 303(d) list. Panguitch Lake has exceeded State Water Quality Standards for total phosphorus and dissolved oxygen. Yankee Meadows Reservoir has exceeded State Water Quality Standards for dissolved oxygen, temperature, and pH. Detailed descriptions of these lakes and their associated water quality are available in “Utah’s lakes and reservoirs” (Utah Dept. of Environmental Quality 1997).

There are no municipal watersheds within the Project Area. The subdivisions within the Project Area obtain water from wells except the Rainbow Meadows Ranchos subdivision which obtains water from a spring.

CUMULATIVE EFFECTS AREA

Cumulative Effects Watersheds (CEWs) were delineated to analyze the downstream and cumulative effects i.e., water quantity, water quality, channel morphology of each alternative. A description of these CEWS is contained in Table 3-13. A map of the CEWS is contained in Appendix 0b. A very small portion of the Spruce Focus Area lies within the headwaters of the Bower Creek Watershed. This watershed will not be analyzed in terms of cumulative effects because the Focus Area covers less than 100 percent of the watershed; cumulative effects are expected to be negligible.
Table 3-13. Cumulative Effects Watersheds.

<table>
<thead>
<tr>
<th>WATERSHED</th>
<th>LOCATION AND EXTENT</th>
<th>ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Creek</td>
<td>from the Center Cr./Parowan Cr. confluence to headwaters</td>
<td>8,965</td>
</tr>
<tr>
<td>Clear Creek</td>
<td>from Parachute Lake to headwaters</td>
<td>8,557</td>
</tr>
<tr>
<td>Blue Springs Creek</td>
<td>from Parachute Lake to headwaters</td>
<td>10,294</td>
</tr>
<tr>
<td>Mammoth Creek</td>
<td>from Mammoth Cr./Tommy Cr. confluence to headwaters</td>
<td>24,369</td>
</tr>
<tr>
<td>Tommy Creek</td>
<td>from Mammoth Cr./Tommy Cr. confluence to headwaters</td>
<td>17,040</td>
</tr>
<tr>
<td>Midway Creek</td>
<td>from Midway Cr./Deer Hollow Cr. confluence to headwaters</td>
<td>10,265</td>
</tr>
</tbody>
</table>

FISHERIES RESOURCE

This report describes the affected environment for the fisheries and aquatic macroinvertebrates resources within the project and cumulative effects analyses area. Parameters that will be discussed for these streams where the data is available include fish population attributes, physical habitat conditions, and macroinvertebrate communities.

The National Forest Management Act (1976) required the National Forests to select a group of aquatic species whose populations could be monitored relatively easily. Response of these species to management activities is used as an indicator of effects on other species which require similar habitat. See Forest Plan (all 14-17) for a discussion of the species selected. Trout and aquatic macroinvertebrates are indicator species which occur in the analysis area and which will be used for this purpose.

FISH POPULATIONS

Fish-bearing streams within the project area include Mammoth Creek, Lower Creek, Castle Creek, and Bunker Creek. Fish population surveys have not been conducted in that portion of Deer Creek within the project area but no fish have been visually observed. All of the streams listed above are classified as Class 3 trout streams by the Utah Division of Wildlife Resources. Class 3 trout streams are considered important since they comprise about half of the total stream fishery habitat in Utah and support a significant amount of angling pressure.

Mammoth Creek and Castle Creeks are both designated as WA management areas in the Forest Plan. Management goals for these areas are to provide for healthy riparian ecosystems that support viable populations of fish and wildlife and meet water quality standards (see page IV 135, Forest Plan). Management activities within these areas are implemented to achieve multi-resource objectives that emphasize riparian values.

All of these streams are in the upper end of watersheds and are fairly small in size. As a result fish production is somewhat limited. The predominant fish species is brook trout (Salvelinus fontinalis) with some Yellowstone cutthroat trout (Oncorhynchus clarki) present in the upper end of Mammoth Creek. There are no endangered, threatened or sensitive fish species in the project area.

FISH HABITAT

Level II riparian inventories were completed on Mammoth, Deer and Bunker Creeks during the summer of 1994. Census surveys and personal observations were made on Castle and Lower Creeks. The types of data collected include information about plant communities, successful status, stream channel morphology and channel bed composition.

Mammoth Creek within the project area is generally in good condition. Approximately 33 percent of the stream is pool habitat formed by small to moderate sized boulders. Large woody debris, important for pool formation, habitat complexity and cover, is lacking as much of the stream flows through willow and grass/forb dominated riparian complexes. Sedimentation is generally slight (< 10 percent) and the streambanks are fairly stable with some undercut banks present.

Surveys of Bunker Creek showed that habitat conditions for trout within the project area were fair to poor. This is primarily due to the lack of pools (30 percent) in the stream. Low to moderate amounts of large woody debris were present in the upper reaches. The stream is fairly low gradient and dominated by a cobble substrate. Sedimentation is slight (< 10 percent) and spawning habitat appears to be good. The upper Bunker Creek riparian structure appears to be in a general decline. Specific impacts from grazing were observed in the upper reaches as well as washed out beaver dams. These appear to be the dominant factors affecting fish habitat.

Fish habitat in Deer Creek is poor as a result of severe downcutting and bank instability caused from the diversion of water from Castle Creek to Deer Creek. As a result of the diversion, thousands of yards of rock and soil have been removed and deposited downstream. The down-cutting is continuing and eroding headward. Large woody debris is present in the stream where the downcutting has occurred. Sedimentation is slight to heavy and pools are generally lacking in the project area.

Only a short section of Lower Creek is within the project area. Habitat conditions appear to be good although the stream is relatively small in size. The stream channel is stable and dominated by cobbles and rock. Castle Creek is also in good condition prior to its diversion into Deer Creek. Large woody debris and pool habitat is abundant. Spawning habitat appears to be good and sedimentation low.

CUMULATIVE EFFECTS AREA

The CEA is shown in Appendix 10b. There are no endangered, threatened or sensitive fish species within the cumulative effects area.

Mammoth Creek below its confluence with Tommy Creek is classified as a Class 2 wild trout stream by UDWR with brown trout (Salmo trutta) and rainbow trout (Oncorhynchus mykiss) being the predominant trout species. The lowermost section of Tommy Creek also contains small trout fishery. A more detailed description of these streams is contained in the Sidney Valley Recovery Project EA (pp 3-18b), the Blue Springs/Reeds Valley Recovery Project EA (pp 3-20 and 3-21) and Tippets Valley Timber Harvest EIS (pp 3-26).

Clear and Blue Springs Creeks are classified as Class 3 trout streams by UDWR. The lower reaches of Clear, Blue Springs and Bunker Creeks were chemically treated with rotenone in 1991 by UDWR as part of the larger Parachute Lake fish eradication project. The purpose of the treatment was to eradicate Utah chub which were competing with the trout populations in the lake. The streams have self-sustaining populations of brook trout and were restocked with rainbow trout as well. Habitat conditions are fair to good for trout with adequate pool and spawning habitat.

No formal habitat or population surveys have been conducted on Center Creek and it is not known whether the stream contains a trout fishery. However, personal observations have noted that streamflow is highly variable and that a great deal of sediment is transported during periods of high flow. No trout have been observed and it is doubtful that the stream could support a viable trout fishery.

Duck Lake is in the Midway Creek watershed and provides a high use recreational fishery. The lake is almost exclusively a ‘put and take’ brook and rainbow trout fishery. Midway Creek does not support a fishery.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates are discussed in the Water Quality section of Chapter Three - Hydrology Section. Additional discussions are included in the Blue Springs/Reeds Valley Recovery Project EA (pp 3-20 and 3-21), and Tippets Valley Timber Harvest EIS (pp 3-26).
WILDLIFE RESOURCE

Table 3-14 identifies the species addressed under the Affected Environment and describes their status. These are: 1) Threatened, endangered or proposed for Federal listing, 2) species listed on the Utah Sensitive Species List (UDWR 1997), 3) species listed on the Regional Forster’s Sensitive Species for Region 4, the Intermountain Region (called “sensitive species” in this document), 4) management indicator species (MIS), and 5) other species of concern. Species that were brought to our attention during scoping and not already listed on Table 3-14 are blue grouse, flying squirrels, and bats. The project falls within substantial yearling blue grouse habitat. Because Ute’s ladies’ dresses and Utah prairie dog have no habitat and have not been documented in the project area, they will not be discussed further in this document. Aquatic and amphibian species will be discussed under the Fisheries discussion.

Status definitions used on Table 3-14:

- Federal Status Code:
  - I Endangered - Taxa formally listed as endangered.
  - T Threatened - Taxa formally listed as threatened.
  - P Proposed for I - Taxa proposed to be formally listed as endangered or threatened.
  - C Candidate - Taxa previously in Category 1, substantial biological information on file to support proposing to list as endangered or threatened.

- State Status Code:
  - I Endangered - low or declining numbers, special management needed.
  - T Threatened - likely to become endangered, special management needed.
  - SP Special concern - due to substantial decrease in population, distribution or habitat availability.
  - SD Special concern - due to limited distribution or specialized habitat.
  - SD-SP Special concern - both SP and SD above.

- Other Codes:
  - Sensitive Species on the Intermountain Region, Regional Forster’s Sensitive Species List.
  - MIS Management indicator species identified in the Forest Plan.

The general species and habitat accounts and the legal requirements for these species can be found in “Life History of Endangered, threatened, and Sensitive Species of Dixie National Forest” revised March 1997 (Rodriguez 1997), and the Biological Assessment for Threatened, Endangered and Proposed Species for the Spruce Bark Beetle Salvage Sale Program within the spruce-fir cover type on the Cedar City Ranger District (Rodriguez 1993). These documents are incorporated here by reference. The amount and condition of old growth in the project area is discussed in the Vegetation Sections. Species generally associated with old growth habitat analyzed in this document are discussed under the heading of that species (Mexican spotted owl and northern goshawk). Habitat characteristics more specific than the accepted old growth definitions have been established for these species and are considered more appropriate for habitat analysis.

Table 3-14. Habitat suitability for listed species.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SCIENTIFIC NAME</th>
<th>STATUS</th>
<th>SUITABLE</th>
<th>HABITAT SUITABILITY BASED ON:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peregrine Falcon</td>
<td>Falco peregrinus</td>
<td>Federal E</td>
<td>X</td>
<td>Documented upland, known foraging area. Meadow, parkland, and cliff habitats present.</td>
</tr>
<tr>
<td>Southwest Willow Flycatcher</td>
<td>Empidonax ocularis</td>
<td>Federal E</td>
<td>X</td>
<td>Riparian vegetation with willows potentially large enough for yellow-rumped warblers present in the project area. No documented occurrences.</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
<td>Federal T</td>
<td>X</td>
<td>Water bodies present where eagles may forage in fall or early winter.</td>
</tr>
<tr>
<td>Utah Prairie Dog</td>
<td>Cynomys parvus</td>
<td>Federal T</td>
<td>X</td>
<td>No suitable openings with deep soil and willow vegetation. Nearest known colonies at Panguitch Lake and Bear Valley.</td>
</tr>
<tr>
<td>Mexican Spotted Owl</td>
<td>Otus lucifugus</td>
<td>Federal T</td>
<td>X</td>
<td>No suitable cottonwoods, however, documented occurrences near the project area, winter and summer.</td>
</tr>
<tr>
<td>Ute Ladies’ Dresses</td>
<td>Spezardus alternatus</td>
<td>Federal T</td>
<td>X</td>
<td>There is no known habitat with suitable elevation in the project area.</td>
</tr>
<tr>
<td>Spotted Rat</td>
<td>Eutamias sibiricus</td>
<td>State SP</td>
<td>X</td>
<td>Cliff and caves present for suitable nesting. Confirmed with spruce-fir. No documented occurrences.</td>
</tr>
<tr>
<td>Western Bighorn Sheep</td>
<td>Ovis canadensis</td>
<td>State SPSD</td>
<td>X</td>
<td>Cliff and caves present for suitable nesting. Confirmed with spruce-fir. No documented occurrences.</td>
</tr>
<tr>
<td>Flammulated Owl</td>
<td>Otus flavescens</td>
<td>State SPS</td>
<td>X</td>
<td>Predominant pine present in the planning area. Flammulated owls have been documented on the east edge of the project.</td>
</tr>
<tr>
<td>Three-toed Woodpecker</td>
<td>Picoides tridactylus</td>
<td>State SPS</td>
<td>X</td>
<td>Spruce fir comprises a major portion of the project area. Three-toed woodpeckers have been documented during surveys.</td>
</tr>
<tr>
<td>Northern Goshawk</td>
<td>Accipiter gentilis</td>
<td>State SP</td>
<td>X</td>
<td>Coniferous and aspen forest present. Documented nesting and foraging.</td>
</tr>
<tr>
<td>Rocky Mountain Elk</td>
<td>Cervus elaphus</td>
<td>MIS</td>
<td>X</td>
<td>Within elk calving high presence summer range within project.</td>
</tr>
<tr>
<td>Mule Deer</td>
<td>Odocoileus hemionus</td>
<td>MIS</td>
<td>X</td>
<td>Winter high presence summer range.</td>
</tr>
<tr>
<td>Wild Turkeys</td>
<td>Meleagris gallopavo</td>
<td>MIS</td>
<td>X</td>
<td>Turkey use area in southern portion of project area.</td>
</tr>
<tr>
<td>Northern Flicker</td>
<td>Colaptes auratus</td>
<td>MIS</td>
<td>X</td>
<td>Coniferous and aspen forest and meadows. No parkland present. Documented use.</td>
</tr>
<tr>
<td>Riparian Habitat</td>
<td>MIS</td>
<td>MIS</td>
<td>X</td>
<td>Riparian habitat present along perennial streams in project area.</td>
</tr>
</tbody>
</table>

ENDANGERED AND THREATENED SPECIES

PEREGRINE FALCON

Suitable nesting habitat exists for peregrine falcon (Falco peregrinus amurensis). A nest is suspected in the north half of the project area. Four known, and two suspected peregrine falcon nests (nests) are within ten miles of the project boundary. A ten mile radius around the nest is an average hunting area, with 80 percent of foraging occurring within a mile of the nest (Spahr et al. 1991). The entire project area falls peregrine falcon foraging areas for more than one nesting pair and up to three pairs in some areas.

Peregrines generally forage along riparian areas or in open meadows which are abundant in the mountain valleys surrounding their nest areas. Peregrines are strong, fast fliers, capturing birds on the wing. This hunting technique requires large open areas, and several studies describe areas greater than 25 acres in size (Porter and others, 1973). There are 8,057 acres of grassland, 870 acres of wetland and 416 acres of shrubland that provides foraging habitat.
on Forest land. On private land there is an additional 1.783 acres of grassland, 31 acres of wetland and 52 acres of shrubland.

The riparian corridor of the meadow parkland.3, wetlands in the SIERP area are larger and more extensive than in areas greater than 25 acres. Some of these are connected. Some of these meadows have eroded and have headcuts within them. (For more information regarding these habitats see the Hydrology Report.) Meadows with headcuts are likely to have degraded habitat conditions to support riparian systems.

For a more detailed account of riparian habitat conditions, see the "Riparian Habitat Conditions: Discussion under Management Indicator Species. below, and the Hydrology section.

SOUTHWESTERN WILLOW FLYCATCHER

Much of the riparian areas within the SIERP are elevated where willows are present, but are either low growing or less than one acre in patch size. Lowder Creek has the greatest potential for willow flycatchers (Empidonax traillii) with willows six to ten feet tall and greater than one acre. The elevation is approximately 9,500 feet, which may be too high for willow flycatchers. No southwestern willow flycatchers have been found in the Bunker Creek area. Bunker Creek, which is upstream from the area where willows spread than ten feet tall, however, the patch sizes are less than one acre, the willows are too isolated, and the elevation of these willows are between 6,000 to 9,000 feet. Surveys for willow flycatchers were conducted summer 1990 on Lowder Creek with negative results (Summers 1997).

BALD EAGLE

Bald eagles (Haliaeetus leucocephalus) occur in the Dixie National Forest during winter months as few numbers, but many are found along open water-stream courses and in the considerably woodsy areas of The Northen States Bald Eagle Recovery Plan (USD 1983) does essential wetting habitat as locations which are used annually for two weeks or longer by birds known to be from a nearby breeding area. 2 and 3 are used annually 1: 15 or more eagles for 2 weeks or longer, and 3 are used during periods of extremely harsh weather, usually feeding on two or more night roost sites. Neither critical or essential habitat has been described on the 1.25 F.W. During winter of 1996-1997 surveys conducted in the Panguitch Lake area ap-approximately four miles east of the project area documented use that may the meet definition of essential wetting habitat increasing criterion 52 above) depending on consistent use for three years. In order to determine if use of these wintering sites will be consistent will need to be determined with further surveys. The project area is high elevation (3-600 feet) with a few small bodies of water. As a result of low temperatures and poor food availability, winter bald eagle use is limited to non-existent in the project area. The nearest known winter roost to the west is approximately five miles west. The eagles using the roost west of the project area forage in the Valley and Lake basin, but none of the known wintering sites within the SIERP area documented use that may the meet the definition of essential wetting habitat increasing criterion 52 above) depending on consistent use for three years. In order to determine if use of these wintering sites will be consistent will need to be determined with further surveys. The project area is high elevation (3-600 feet) with a few small bodies of water. As a result of low temperatures and poor food availability, winter bald eagle use is limited to non-existent in the project area. The nearest known winter roost to the west is approximately five miles west. The eagles using the roost west of the project area forage in the Valley and Lake basin, but none of the known wintering sites within the SIERP area documented use that may the meet the definition of essential wetting habitat increasing criterion 52 above) depending on consistent use for three years. In order to determine if use of these wintering sites will be consistent will need to be determined with further surveys.

MEAN SPOTTED OWL

More than 20,000 acres of "spice"-for on the Cedar City Ranger District has been surveyed for Mexican spotted owls (Strix oreas sudbudrenis). From 1992 to 1995, 5 Mexican spotted owls have been detected in the spice-for area (SMB 1, 1992; SMB 1, 1995).

Historically, and currently throughout southern Utah, spotted owls have been found nesting only on ledges or small cavities in steep (40 degrees) slopes within canyons with rocky walls and mixed forest-conifers below 8,000 feet (Hume, et al. 1994; Willey 1993).

During the winter of 1996-1997 a radio-collared adult male and a radio-collared juvenile owl from Jum National Park were located in the Snowline George Wildlife Area west of the project area (Willey 1992). These owls may have used the spice-for area for foraging. The same adult bird was radioed again in 1994, but has remained near her breeding territory. The same January 1996 (prem. comm. D.Willey 1994). In June 1996, a radio response was detected from an area occupied by a female Mexican spotted owl. The following visit in July yielded two small birds dead. Thus, the project area could be considered for foraging (summer and winter), juvenile desertvar or wintering habitat for Mexican spotted owls. Wintering wintering habitat is considered October 1 - November 1 and the breeding season is March 15 through September 15 (USD 1995). No habitat has been designated as critical for the Mexican spotted owl on the Dixie National Forest.

Cedar City Ranger District Dixie National Forest

The Dixie National Forest is within the Colorado Plateau Recovery Unit for the Mexican spotted owl (USD 1995). Three different management areas are described in the Mexican Spotted Owl Recovery Plan: (1) Protected Activity Center, (2) A known or known locations where the Mexican spotted owl (10) Forest and woodland types where no specific guidelines are provided, but general recommendations are given to manage these areas for landscape diversity within natural ranges of variation (USD 1995). A PAC has not been officially delineated for the potential pair of spotted owls near Brian Head due to the pair has not been confirmed and the nest area has not been identified. The SIERP area consists of spruce-for and aspen primarily, r the "other forest and woodland types" are the guidelines that would apply.

SPECTIVE SENSITIVE SPECIES

THREE-TOED WOODPECKER

Three-toed woodpeckers (Dendrocopos tridactylus) inhabit primarily spruce-for habitats on the Dixie National Forest. Although they have been reported in mixed conifer plant community types as well. The project area has 26,443 acres of spruce-for and insect free types in the SIERP planning area. Six percent of this is on private and the remaining is on national forest.

Aspen stands in the project area equal approximately 9,181 acres. Aspen stands are an important element in stands for cavity-dependent species, including the three-toed woodpecker. With the current beetle infestation it is estimated that stands with more than three or more snags per acre are considerably higher than the stand exams data shows. In addition, stand exam data may not portray an accurate measure of snag densities because of the limited acreage and asian populations that are generally distributed, which the are not. However, they are the best data available. It is assumed that in the roadside area, since no harvest has occurred, that snag densities would meet or exceed standards and guidelines. The roadless area is 8,128 acres, about half of which is comprised of lava rock and the other half spruce-for with a heavy aspen component in some places.

Three-toed woodpeckers have been observed foraging in the project area. Surveys conducted in 1996 resulted in responses to playbacks, indicating territoriality, but no nests were found. High concentrations of three-toed woodpeckers were documented in the Bunker Creek drainage with an average of 1.87 birds per station (Summers 1997). For comparison, Sydney Valley had an average of 0.7 birds per station along the road (long term monitoring transects) and 0.8 per station within the safe area. Insected trees throughout the project area are attractive foraging sites for these woodpeckers. Currently areas infested is estimated at 7,400 acres. Three salvage timber sales have taken place in the last five years (Sydney Valley, Rainbow Meadows and Brian Hailey) to remove dead and flog insected trees. These areas total 3,122 acres, or 42 percent of the infested acreage.

NORTHERN GOOSEHAWK

To date (1/7/70) there are four documented northern goosehawk (Accipiter gentilis) nesting territories within the project area. Foraging occurs within the project area from at least two other nesting territories. Over half of the project area has been surveyed at least two years in a row, but not all the same years. Intensive surveys were conducted on 13,304 acres, and photo interpretation and "walk-throughs" on 79,887 acres of forested land. Table 3-15 shows the distribution of vegetation structural stages (VSS) (Reynolds et al. 1994). If a given area is suitable breeding habitat for the species the breeding area may be considered for foraging (summer and winter), juvenile desert var or wintering habitat for Mexican spotted owls. Wintering wintering habitat is considered October 1 - November 1 and the breeding season is March 15 through September 15 (USD 1995). No habitat has been designated as critical for the Mexican spotted owl on the Dixie National Forest.

Spruce Ecosystem Recovery Project DES

Spruce Ecosystem Recovery Project DES

3.33
may be used by goshawks and other wildlife. In other words, goshawks have nested in dead trees and dead Nest/areas, but do not nest in areas that have been salvaged or sanitation treatments that reduce tree diameters and open stands with little canopy cover.

Table 3-15. Percent acreage of the SERP area existing in each VSS for aspen.

<table>
<thead>
<tr>
<th>Cover Type</th>
<th>VSS 1.2 (desired)</th>
<th>VSS 3.4.5 (desired)</th>
<th>VSS 6 (desired)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspen</td>
<td>35% (40%)</td>
<td>95% (80%)</td>
<td>2% (30%)</td>
</tr>
</tbody>
</table>

The desired percentages are obtained from the Northern goshawk recommendations (Reynolds 1992) which were developed in terms of sustainability over time for each cover type. In spruce and spruce-fir habitats, the desired percentage may have been met historically over large geographic regions, but because of the role of insect epidemics and possible stand replacing fires the percentages may not be within the desired shown above. This is considered to be within a natural range of variability on the landscape level.

Table 3-16 shows the forested acres with the predominant tree stocking in the indicated size classes. A majority of the forested acres is within the large category with nearly equal acreage in the medium and very large category. These data indicate that large diameter trees needed for nesting habitat, mean dbh of 20 inches or larger (Reynolds 1992, page 144), are limited in the project area. This will be continuing as the spruce beetle causes more mortality.

Data from intensive surveys on national forest land (no private) yielded 17,559 acres in the SERP area on national forest with at least three snags per acre with a dbh of 18' or greater (12" used for aspen). This is 47% of the forested acres in the SERP area. Spruce-fir habitat types comprise 95% of these acres. Intensive surveys also yielded 25,866 acres with at least three snags per acre with a dbh between 12.0' and 17.9', which is 69% of the forested acreage in the SERP area. Ninety-one percent of these acres are in spruce-fir habitat types.

<table>
<thead>
<tr>
<th>COVER TYPE</th>
<th>SMALL 1.4'-9'</th>
<th>MEDIUM 9'-8.0'</th>
<th>LARGE 9.0'-15.9'</th>
<th>VERY LARGE 16.0' or greater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspen</td>
<td>129</td>
<td>2,500</td>
<td>6,282</td>
<td>70</td>
</tr>
<tr>
<td>Alpine fir</td>
<td>149</td>
<td>83</td>
<td>53</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Blue spruce</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>126</td>
<td>62</td>
</tr>
<tr>
<td>Douglas-fir</td>
<td>&lt;1</td>
<td>93</td>
<td>571</td>
<td>349</td>
</tr>
<tr>
<td>Engelmann spruce</td>
<td>571</td>
<td>1,095</td>
<td>1,370</td>
<td>808</td>
</tr>
<tr>
<td>Larch pine</td>
<td>23</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Spruce-fir</td>
<td>766</td>
<td>1,108</td>
<td>14,735</td>
<td>4,990</td>
</tr>
<tr>
<td>White fir</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>444</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

TOTAL 1,838 5,079 23,081 4,279

Percent 95 195 628 188

Walk through and photo interpretation data show 4,734 acres on national forest and 1,128 acres on private with less than three snags per acre of 18' dbh or greater (12' for aspen). This is 16% of the forested acres in the SERP area. In the same size category, the same survey type resulted in 18,534 acres on national forest and 1,128 acres on private with at least three snags per acre. This comprises 46% of the forested areas in the SERP area.

Therefore, according to these data 96% of the forested acres in the SERP area meet three snags or more per acre of 18' or greater and 69% of the forested acres have three snags per acre between 12' and 17.9' dbh. This can be attributed to the spruce bark beetle infestation, creating snags. The spruce bark beetle infestation has undoubtedly had influence on the numbers of snags present in the project area.

SPOTTED BAT
Spotted bats (Euderus umbuncus) have been detected in formal surveys on riparian areas near rocky outcrops on the southerly portion of the Cedar City Ranger District area during the summer of 1994 (Lengas 1994). These were audible calls detected during an aerial survey at night in early October 1994 within the project area at the following locations: (1) Center Creek, Second Left Hand Canyon, R I W, 7355, Section 18, SW ¼ 1/4, NE ¼ 1/4, and (2) a pond, Castle Creek Drainage, R I W, 7355, Section 18, SE ¼ 1/4. This survey was conducted at Tandy Meadow, in the project area. No bats were netted, but bats were seen and heard via echolocation (Foster, 1996).

Although the Programmatic Spruce-fir Biological Evaluation (Rodriguez 1993), and Sidney Valley EA (USDA Forest Service 1994), Chapter 3, p. 20 states that no suitable roosting habitat (rocky cliffs, caves, and rock outcrops) for the spotted bat exists within the project area, Zerlinski and Collett (1988) state that they may inhabit coniferous forests. Spotted bats are strong fliers and have been observed to move up to 6.2 miles (USDA 1995) from roosts or capture sites, and potential roost habitat exists within the project area and immediately adjacent. In addition, since audible vocalizations were detected in coniferous habitats at the south end of the district, spotted bats may inhabit or forage within the Spruce Ecosystem Recovery Project area.

WESTERN BIG-EARED BAT
Western big eared bats (Corynorhinus townsendii) have not been detected on the Cedar City Ranger District. Western big eared bats forage primarily in flight on small lepidoptera along forested edges (Konz and Martin 1982). Suitable habitat for western big eared bats is present within the project area (Programmatic Spruce-fir Biological Evaluation (Rodriguez 1993), and Sidney Valley EA (USDA Forest Service 1994), Chapter 3, p. 20).

The factors most critical for use asning bat populations are the presence of a variety of roost sites isolated from human disturbance, and the availability of free standing water (Lengas 1994). Potential roost sites and free standing water is available in the project area, and immediately adjacent (potential roosting habitat in the cliffs areas in and north of Cedar Breaks National Monument and Ashdown Gorge Wilderness Areas. The project area may be used for foraging by western big eared bats.

FLAMMULATED OWL
Flammulated owls (Otus flamulatus) are primarily found within mature ponderosa pine and mixed conifer forest cover types. Although flammulated owls are generally associated with mature ponderosa pine, the owl has been recorded in other cover types such as second growth pine, pinyon pine, and aspen (Reynolds and Linkhart 1994). Flammulated owls have been detected in seven locations within or immediately adjacent the west side of the project area. These detections were during the breeding season and are assumed to be reproductive pairs. Despite the lack of evidence of consistent use of the spruce-fir ecotype, this discussion assumes that mature (old growth) spruce forest provides for best potential habitat for foraging flammulated owls. This assumption is based on documented preferences of flammulated owls, nesting and foraging in mature pine and mixed conifer (Reynolds and Linkhart 1984). Blocks of old growth 68 acres in size encompass the largest known territories. In general, territories in habitats of lesser quality are smaller.

The bark beetle infestation presently in the spruce and spruce-fir stands could be a time limited and opportunistic numerical response by flammulated owls, since they are not known to nest in the spruce-fir habitat and they migrate by October.
Large diameter trees are important for providing future snag for flammulated owl nesting. Table 3.17 shows the average cover type and tree size. The sizes are defined using the majority of tree stocking. These data indicate that most of the diameter sizes are in the large category, and most of this is in the spruce-fir cover type.

**MANAGEMENT INDICATOR SPECIES**

The northern goshawk, which is both an MIS and a Sensitive Species, is discussed under the Sensitive Species heading.

**ROCKY MOUNTAIN ELK AND MULE DEER**

Because the basic habitats required for elk (Cervus canadensis) and deer (Odocoileus hemionus) are very similar (Thomas et. al. 1979) they are grouped here for discussion. Site-specific needs for one species or the other will be identified where appropriate. The SERP area is part of the Panguitch Lake (93% of the SERP area) and Zion (7%) mule deer herds. There are approximately 100 acres of high priority deer winter range. The SERP area contains areas designated as high priority summer range for both elk and deer (pers. comm. B. Bonebrake 1990). High priority use designation is based on numbers of elk and deer that use the area, not physical characteristics of the area. High priority elk summer range is 48,565 acres of the SERP area, whereas low priority summer range comprises 4608 acres.

Deer and Elk habitat quality is directly related to forage/cover ratio and road density in the area (Thomas et. al. 1979). Aspen areas provide valuable forage in early seral stages and cover in the older seral stages. Elk calving takes place in the Deer and Bunker Creek areas, which are lower elevation than the rest of the project area. These areas are important foraging grounds for elk and deer as well.

The high elevation of most of the project area limits deer and elk use to summer and early fall. The major importance of the forested stands for both species is hiding and thermal cover when using the adjacent open areas for feeding. Trees near meadows generally have well developed crowns which extend toward the ground for excellent hiding cover. The high density of trees within many stands also contributes to the available hiding cover. These structural attributes of the forested areas also ameliorate temperature extremes for both mule and elk. The grass-barkbrush layer is generally scarce underneath the forest canopy due to lack of light at ground level and the heavy duff layer. The forested part of the project area has limited value as elk and deer foraging habitat.

A forage/cover ratio of 40/60 is considered optimum (Thomas et. al. 1979). Stand exam data “elk cover” computer runs indicate that cover is 85% of the SERP area and 74% of the project area (minor areas that cannot provide either cover or forage). Rock Water urban development. The amount of cover provided by each cover type (plant community) use of trees and portion of the tree providing cover is shown on Table 3.17.

According to Christensen et al. (1993) roads are undoubtedly the most significant consideration on elk summer range. Habitat effectiveness for elk decreases below 60% of its potential at road densities above 2 miles/square mile. The open road density in the project area is above the Forest Plan standards and guidelines of 2.8 miles/square mile on one watershed in the project area. Road density in the project area is estimated at 2.45 miles per square mile. The reason for this high road density is previous timber harvests in the area. A majority of these roads are in the Deer Valley area.

**WILD (MERRIAM’S) TURKEY**

Wild turkeys (Margaropus mermis) have been observed in the Spruce Ecosystem Recovery Project area (Coles pers. comm. USDA 1995). The high elevation of the area restricts the potential season of use to mid summer and early fall which precludes nesting (nesting dates are April 15 to May 30, UDWR). There is, however, potential suitable summer range and broad rearing habitat.

Turkeys presently use the Deer Valley area and around the Yankee Meadows area (USDA 1995). The openings in the Deer Valley area are just beginning to provide habitat for turkeys after the previous harvest activities.

Turkey populations are presently doing well, but this trend is highly dependent upon weather conditions (Grundy, pers. comm.).

**NORTHERN FLICKER**

Because the northern flicker (Colaptes auratus) is somewhat of a habitat generalist, there is suitable habitat throughout the project area except where habitat consists of non-vegetative material (i.e. rock, talus, cliffs). Snags are necessary for reproduction and, therefore, the limiting factor for flickers. Aspen is an important habitat component for nesting flickers (Reynolds et al. 1992).

Snag data is discussed above, under three-need woodpecker. According to these data, 98% of the forested acres in the SERP area meet three snags or more per acre of 18" or greater and 69% of the forested acres have three snags per acre between 12" and 17.9" dbh. This can be attributed to the young tree bark beetle infestation, creating snags. The spruce bark beetle infestation has undoubtedly had influence on the numbers of snags present in the project area.

There are 9,181 acres of aspen suitable for nesting in the project area, including on private land. Eleven percent of this aspen is located on private land.

**RIPARIAN HABITAT CONDITIONS**

Level II Integrated Riparian Evaluations were conducted on Mammoth, Tommy, Banker, Deer, Duck, and the West Fork of Asay Creeks. Stream channel conditions are listed in the Hydrology section.
Complexes were assessed as being in "proper functioning", "at risk", or "non-functioning" condition (USDI 1995). This assessment uses stream bank conditions, and vegetation along the edge of the stream (greenline) on which to base these assessments. The quality of the vegetation for wildlife was not assessed. Therefore, there may be some understory "proper functioning" that do not provide suitable habitat for some riparian dependent species, particularly those that require vertical structure and patch size.

Deer Creek has willows on six complexes. Six of the eight complexes measured were assessed as having early or very early salar status vegetation. Deer Creek was estimated as "at risk" and "non-functional" in four of the eight complexes measured. One of the "non-functional" complexes has willows present. The other complexes were assessed as in proper functioning condition. Past beaver activity was documented in two of the reaches, one in a "non-functional" and one at "risk" conditions. This stream, therefore, does not have suitable conditions to support a variety of wildlife species dependent upon riparian.

Bunker Creek was assessed as having a predominance of mid to late salar status and all complexes were assessed as in proper functioning conditions. Willows were present on five of the seven complexes. Although willows are present, many of their shapes reflect livestock grazing (mushroom shaped). No beaver activity was docu-
mented at Bunker Creek, including suitable habitat for wildlife species, but willows shape and patch size would create habitat for more species, particularly birds. It rated as "non-functional", it would certainly characterize poor conditions for riparian dependent wildlife.

Dog Creek complexes are in mid to late salar status. Willows are present on all complexes and are in good condition. They have a good patch size and patch size. Beaver sign was documented on one complex. Dog Creek is rated as proper functioning. Recreation use primarily fishing is heavy along Dau Creek in the spring, summer and fall months. Monitoring this stream is in good condition, however, the disturbance factor is high with all the people and recreation.

West Fork Avery Creek was assessed as proper functioning and one complex and other non-functioning at or risk of on the other three complexes. All complexes were in the very early status. Willows are present on three of the complexes and of those present, other non-functioning or at risk. No beaver activity was documented. West Fork Avery Creek does not provide desired suitable habitat for riparian dependent wildlife.

Mammoth Creek was rated at risk on one complex and as proper functioning in the other six complexes. All complexes have willows present. The complex at risk has beaver present documented.

Tommy Creek has no willows present and no beaver activity. The functional level was assessed at risk on four complexes and proper functioning on the other three. The salar status ranges from early to late. The risk ratings indicate that habitat to support riparian wildlife is lacking or at least not meeting potential in these areas.

OTHER SPECIES OF CONCERN

BLUE GROUSE
Blue grouse (Dendragapus obscurus) inhabit montane coniferous and coniferous-deciduous forests. They are a hardy species within the Cedar City Ranger District. The project area is designated as substantial year long blue grouse habitat based on numbers of grouse using the area, not on physical characteristics. Blue grouse numbers are good (USDI 1995). Blue grouse numbers—observed in 1995 increased from 1994 by 60%, indicating that forest grouse populations continue to rebound from the devastating winter of 19L92 (USDI 1995). Areas in stands located above steep forested slopes along the southern project boundary provide important winter roost habitat for blue grouse. In these areas, the steep forested slopes result in the best coniferous forest habitat available for blue grouse on the project area (USDA 1995).

The blue grouse nest is often hidden under branches of a fallen tree, under a shrub, or beside a log (Ehrlich et al 1990). The nest is a shallow depression lined with vegetation, usually a few feathers (Ehrlich et al 1990). The nest edges can be recognized by the thin diameters of the eggs. One female will raise 1-2 broods. Blue grouse are primarily year-round residents. First year males rarely establish breeding territories, and therefore do not breed. Males inflate their neck sacs to amplify their shouting, which they do voluntarily, not on leks as do other grouse species.

The diet of the blue grouse consists mostly of leaves, especially conifer needles, also flowers, fruit, and insects, particularly grasshoppers (Ehrlich et al 1988). The young feed heavily on insects. During winter, coniferous needles provide the main food.

NORTHERN FLYING SQUIRREL

The northern flying squirrel (Glaucomys sabrinus) actually glides, using stiffened skin that extends from the wrists to the ankles to support them (Zevoloff and Collett 1988). They can turn and even change the angle of their de-
scent by adjusting the unfolded skin, called a patagium. Just before stopping, they drop the tail and raise their fore-
quartes, which slackens the flight membranes so that they serve as air brakes. This allows them a gentle landing on a tree trunk. Tapping a tree containing a woodpecker hole can sometimes prompt them to look out.

The northern squirrel inhabits the northern part of the continent in mature conifer forests, but also occur in mixed conifer-deciduous and even purely deciduous forests (Zevoloff and Collett 1988). In southwestern Utah, they have been found in Engelmann spruce forests from 7,900 to 10,300 feet and along stream bottoms surrounded by coton-wood and white fir (Zevoloff and Collett 1988). Live trap small mammal surveys were performed with the Cedar City Ranger District in 1995 and 1996. Five species and 86 individuals were captured in 1995 with no flying squir-
rels. In 1996, six different species and 101 individual mammals were captured, including three flying squirrels (McDonald et al 1996).

Snags are an important component for nesting and wintering flying squirrels. In winter, most seek refuge in a tree cavity, including those abandoned by woodpeckers and red squirrels. Inside they feed on their reserves of invertebrates, seeds and some vegetation. Flying squirrels consume a wide variety of hardwood seeds, flowers, insects, and baby birds. They do not store food in the winter. Fungi may also be an im-
portant food. Northern flying squirrels chew away bark between sapwood holes, which increases the flow of tree sap on which they forage.

They are preyed upon by owls, hawks, martens, foxes, and house cats. A pair of spotted owls can consume about 500 flying squirrels annually. They are active two separate times during the night; right after dark and just before daylight. They do not apparently enter torpor or hibernate during the winter.

In late May or June the young arrive at the young arrive at 37 to 42 gestation period (Zevoloff and Collett 1988). The average litter size is two to four and second litters are not uncommon. The patagium is present upon birth, but they are ex-
tremely dependent upon the parents. Weaning occurs at two months, but the young remain with the mother for much of the year. Mothers raise the young without any direct assistance from the males.

BATS

A detailed account of the bats that could occur or habitat within the project area is located in "Effects of Livestock Grazing at Proper Use on the Dixie National Forest" and is incorporated here by reference (Grider et al 1993, pages 101-106). A summary of habitat requirements is shown below.

California myotis (Myotis californicus)

Desert and semidesert, grasslands, ponderosa pine, narrow crevasses on rocky hillocks, mine tunnels, man made structures, shallow terraces, under loose slabs of rock. Roosts on small desert shrubs, rock outcrops and on the ground. Habits include tree canopy, over water and above ground. Probably does not occur within the SERP area.

Western small-footed bat (Myotis ciliolabrum)

Variety of habitats, including desert, semidesert, forested stands along watercourses. Moderate elevations. Roosts in rocky outcrops, deep crevasses, loose bark, buildings. Hunts low among trees and brush. Three individuals were documented on the Cedar City Ranger District in the Mammoth Creek area in 1994 (Engels 1994).

Long-eared myotis (Myotis evotis)

Mostly forested areas, variety of habitats where roosts are available. Short-grass prairie, semiarid shrublands, chaparral, agricultural areas, open meadows, water courses, reservoirs, deciduous forest edges, dry coniferous for-
est and subalpine forest. Roosts in buildings, hollow trees, loose bark, caves, mines, fissures of rocks, sinkholes and terrains. This species was documented on the Cedar City Ranger District in 1994 (Engels 1994).
Fragile Moss (Mossi thomasiana)
Elevations between 4,000 and 7,000 feet in desert, grass, woodland habitats, therefore, probably does not occur in the SERP area and will not be addressed further.

Long-leaved Moss (Mossi roei)
Montane coniferous forests (spruce, juniper, ponderosa pine, subalpine forests, riparian areas and rarely in arid lowlands. Rocks in abandoned buildings, cracks in the ground, crevices in cliff faces and beneath loose bark of trees. Night roosts are in caves, mines, that are also used as hibernacula. Has been documented in the Mammoth Creek area on the Cedar City Ranger District (Leng 1994).

Yarn Moss (Mossi yuccaformis)
Attracted to wet areas, most found in arid environments, deserts and grasslands. Rocks in caves, mine tunnels and buildings. This species most likely does not occur in the SERP area and therefore will not be discussed.

Allen's big-eared bat (Dionusus phylostomus)
Foraged areas pine, oak, riparian woodlands of oaks, cypress, cottonwood, willow and walnut. Elevations range is 2,500 and 9,500 feet, but most found between 3,500 and 7,500 feet. Roosting roosts in rocky areas, cliffs, outcroppings, boulder piles, lava flows. This species may have been documented in Swan's Creek (outside the SERP area) (Leng 1994). Hunts in closed forested environment, adaptable longer between, within and below canopy. Young born in mine tunnels and rock piles.

Brazilian tree-dweller bat (Hypodryas insignis)
Varieties of habitats used; mainly lowlands. Rocks in caves, mines, buildings, culverts, bridges, hollow trees, sink holes. These bats migrate; May fly 50 miles or more to forage. Groups can cover up to 250 square miles. Hunts at a variety of heights, speeds, but most is between 20-90 feet. Was documented in Swans Creek (outside the SERP area) (Leng 1994).

CUMULATIVE EFFECTS AREA

Cumulative effects is the impact on the environment which results from the incremental impact of the actions when added to other past, present and reasonably foreseeable future actions regardless of ownership. A watershed analysis was used during the National Forest Management Act (NFMA) process to analyze the existing conditions in order to proposed activities to meet desired conditions. This assessed the past and present activities by each watershed regardless of ownership. The wildlife species discussed in this document are all or parts of these watersheds, some more about willow and others them. Therefore, these watershed assessment areas will be used for the cumulative effects analysis for this project. See Appendix B.

Biodiversity

Biodiversity is the variety of life and its processes, and includes the variety of living organisms, the genetic differences among them and the communities and ecosystems in which they occur (Keystone 1991, page 6). Biodiversity is important for the integrity and resilience of ecological systems, and to maintain systems capable to provide: food, fiber and other commodities and amenities to humans.

- To maintain biodiversity, the composition, structure and function of ecosystems must be maintained over a landscape. Ecosystems are best understood by defining the composition, structure, and function which they contain. The spruce forest system on the Northern Markagunt Plateau is an ecosystem undergoing major change due to the late successional stages of the vegetation and the effects associated with spruce beetle caused mortality. A description of the biodiversity of this ecosystem is the combination of the all the resources described in this Chapter including the human dimension.

The effects of action and no action on biodiversity is the summation of the effects on the total array of resources carried forward into Chapter Four. Therefore, biodiversity will not be carried into Chapter Four under a separate subject area. The indicators of biodiversity discussed in Chapter Four under the different resource headings include:

- The structure, composition, patterns, and disturbance regimes of the vegetation resource. This includes vegetation attributes such as old growth, coarse woody debris, snags, fragmentation, corridors, and successional status and trend.
- Threatened, endangered, and sensitive plant and animal species
- Wildlife Management Indicator Species
- The Soils, Hydrology, and Fisheries Resources
- The Human Dimension including recreation, visuals, and social/economic needs.

HERITAGE RESOURCES (CULTURAL RESOURCES)
The areas surrounding and within the total project analysis area (52,991 ac) have been identified as being used by human beings for at least 8000 years. A total of 8263 acres within and immediately adjacent to the total analysis area have been intensively surveyed for cultural resources. A total of 63 sites have been found, and of these 55 have been identified as being Hisotnic Properties and are eligible for inclusion in the National Register of Historic Places. Types of sites identified include, but are not limited to, campsites, stone quarries, tool manufacturing areas, kill sites, and long term seasonal encampments. Historic wooden structures such as cabins, fences, water troughs, and corral and bennett areas within the area.

Within the boundaries of the individual Focus Areas a total of 3321 acres have been intensively surveyed for cultural resources and a total of 50 sites have been identified. Of these 29 are eligible for or are currently listed on the National Register of Historic Places.

The project area was surveyed by the Forest Archaeologist and assisted by seasonal archeological technicians.

CUMULATIVE EFFECTS AREA

The cumulative effects area for Heritage Resources is the project area.

SOCIAL/ECONOMIC RESOURCE

The Dixie National Forest Primary Zone of Influence (ZOI) for the social and economic environments are described in the Environmental Impact Statement for the Forest Plan 1996. The ZOI is comprised of a six county area including the following counties: Garfield, Iron, Kane, Pute, Washington, and Wayne. The boundaries of the Dixie National Forest lie within these counties and the economies of these counties are directly affected by Forest actions (Forest Plan EIS, III.1). The discussion of the affected environment will constitute the cumulative effects area for this project. The current condition of the affected environments for the social economic have been described in a watershed assessment completed for the Spruce Ecosystem Recovery Project Watershed Analysis area. The product was a cumulative effects baseline assessment following the guidelines of "Ecosystem Analysis at the Watershed Scale Federal Guide for Watershed Analysis" (Version 22, August 1995).

ANALYSIS UNITS

Because of variation between communities economic bases, the ZOI is further broken down into analysis units by county. Iron, Garfield, and Kane Counties are analysis units comprising the affected environment for the project area and representing a cumulative effects analysis.
The population of Iron County was estimated to be 32,100 in 1996, according to Cedar City/Iron County Economic Development. This is up from the State projections for that year in 1994. Iron County lies in a 20-25% range of urbanization, indicating that most of the population lives in urban centers larger than 2,500 people (Watershed Assessment). The population of Cedar City is approximately 20,000 according to Cedar City/Iron County Economic Development.

Recreation and tourism related to local activities, such as the Utah Shakespeare Festival, are primary contributors to local income and employment, mainly through services provided to area visitors. The area's proximity to the Dixie National Forest and several national parks, its location on a primary north-south interstate corridor between major western population center, and a growing resident and transient population, are some of the contributing amenities and attributes causing overall trends in visitation. Localized tourism in the Dixie National Forest and surrounding land has shown a marked increase since 1996, paralleling statewide trends for this period. The increasing population of Clark County, Nevada is the predominant contributor to escalating visitation, as discussed in the Watershed Assessment. The increase in visitation and population has been documented in USDA Forest Service and USDA National Park Service visitation records, Utah Department of Transportation traffic counts, and census records and projections for Iron County, Utah and Clark County, Nevada.

Visitors to the Dixie National Forest are difficult to separate, and more specifically to the Spruce Ecosystem Recovery Project area. Visitors from Iron County are associated with surrounding National and State forests. The general recreation and tourism market in the project area includes National Forest land. As indicated by ADA Research indicated that 99% of Las Vegas, Clark County area residents surveyed visited the Dixie National Forest. In addition, increasing populations in the six county JUM and the Phoenix and Los Angeles areas are believed to be contributing to this increase.

The town of Brian Head is located in this analysis unit and the northern end of the project area. Brian Head depends upon the nearby Forest land and recreation opportunities as a major part of the economic base. Differing from other communities in the Iron County analysis unit, Brian Head has unique social and economic merit due to the recreation and tourism opportunities depending upon non-commodity Forest products (i.e., timber manufacturing and livestock grazing). Although a shift is taking place in Iron County from a natural resource based to a service and agriculture based economy, other communities in the analysis unit are still tied to some degree to traditional industries which have altered the natural character of their communities' environment to that which is heavily dominated by human activity. Brian Head has developed a social and economic environment based on amenities (i.e., recreation, scenic beauty, solitude, scenery) which depend upon the maintenance of a non-developed, forested environment. Brian Head has invested substantial financial and resource development to support natural recreation and tourism revenue. The county is unique in the winter recreation economy, as it is oriented to the winter recreation economy alone. The residents have a high level of dependence upon non-commodity Forest products, particularly mountain biking. Mountain biking has been increasing rapidly since 1991. Sales tax revenues in Brian Head Town increased 56.5% over the decade between 1986 and 1996. For more information refer to the Recreation discussion in chapters three and four.
levels of government and construction employment opportunities contribute to the total employment. Kane County currently struggles with high unemployment and poverty rates (Watershed Assessment 1997).

The population of Kane County was estimated by the Kane County Travel Council to be over 5.000 in 1996, down 700 people from the 1995 estimate of 5.700. The majority of the population of Kane County live in Kanab (over 4,000 estimated populations, placing it in a range of 40-70% urban overall (Watershed Assessment 1997). As mentioned in the discussions of the Iron County and Garfield County Analysis Units, there has been an increase in homeowners building summer and winter recreational homes on the private land within the boundaries of the Cedar City Ranger District. Both temporary and permanent residents use the nearby Forest land for recreation and contribute to the local economies of communities. Duck Valley Village, located in Kane County, is a community based upon recreation and tourism. Visitors and residents use the surrounding forested lands, including the Spruce Ecosystem Recovery Project area, for sight-seeing, recreational driving, hiking, and other recreational pursuits.

The needs and interests of homeowners in the Iron County, Garfield County, and Kane County analysis units adjacent to or within the Dixie National Forest boundaries differ from those of the temporary Forest visitor or tourist. The passing tourist who wants to avoid areas where epidemic beetle infestation or timber harvest has occurred can move on to a different location during a Forest visit. The local resident has more at risk because the surrounding National Forest constitutes a major component of the "value-added" enhancement to the physical private residence. In addition to the private property investments, local enterprises have evolved to provide goods and services to the growing local community of homeowners.

Recreation and tourism is quickly becoming the major industry in Iron County, Garfield County, and Kane County. Water-based recreational activity areas access the Dixie National Forest. National Parks and Recreation Areas such as Zion, Capitol Reef, Lake Powell, and the newly created Grand Staircase-Escalante National Monument, as well as the numerous other Federal private, and State land recreation destinations are the primary destinations for millions of visitors who may also spend some time on the Dixie, or may simply pass through due to the scenic quality of the route across the Dixie. For additional discussion on the Water-based Recreation at theтоплен Forest area (1997 Project File).

**CUMULATIVE EFFECTS AREA**

The cumulative effects area for Social/Economic is the "Zone Of Influence" as described in the EIS for the Dixie National Forest Land and Resource Management Plan (1988) with primary effects to the Iron County, Kane County, and Garfield County analysis units.

**SPECIAL USES**

The following uses within the Spruce Ecosystem Recovery Project area have been issued special use permits. The USFS Forest Service special use program is intended to support uses on Forest National lands that can not be equitably provided by the government and where as these uses enhance the visitor experience, or ensure their health and welfare. Additionally, the special use program assists state and local government in achieving common interest.

Currently, there are forty active special use permits within the boundaries of the Spruce Ecosystem Recovery Project. The permitted uses include both fixed improvements, easements, and recreational activities. The following discussions of Special Uses will be introduced in the Affected Environment. Only certain discussions of Environmental Consequences for Special Uses will be included in Chapter 4 as a Special Use discussion. Individual Special Use Permits will be discussed within specific resource discussions. The location of discussions of Environmental Consequences for Special Uses will be identified in the Affected Environment discussion.

**FIXED IMPROVEMENTS**

Of the forty active special use permits within the Spruce Ecosystem Recovery Project Area, twenty-six are fixed improvements. Eleven of the fixed improvements are located at the Blowhard Electrical Site. The fixed improvements include a weather station, two warehouse and storage yards, two power lines, one amateur radio transmitter, two microwave common carriers, two microwave industrial sites, one broadcast translator/low power TV & FM

**Spruce Ecosystem Recovery Project DEIS**

**Cedar City Ranger District Dixie National Forest**

**Spruce Ecosystem Recovery Project DEIS**

**Dixie National Forest**

**Spruce Ecosystem Recovery Project DEIS**

**Cedar City Ranger District Dixie National Forest**

**transmitter, one commercial mobile radio service, three telephone and telegraph lines, one navigational equipment station, one irrigation water transmission pipeline, less that 12 inches in diameter, four water transmission pipelines, less than 12 inches in diameter, and one dam/reservoir. The special use permits authorizing these improvements represent long-term commitments of National Forest lands. Permits may vary in duration from five, ten, to twenty years. The fixed improvements represent uses that will not be impacted by either the Proposed Action, or Action Alternatives. Therefore, they will not be discussed in Chapter 4, Environmental,"Effects, as there are all outside the Focus Areas.

**EASEMENTS**

Within the project area there are five Federal Land Policy Management Act (FLPMA) permits. These permits grant the holder legal access across National Forest lands. Three of the FLPMA permits ensure access to area subdivisions, and two permits are issued to the State of Utah for highways crossing through the project area. The FLPMA easements represent uses that will not be impacted by either the Proposed Action, or Action Alternatives. Therefore, they will not be discussed in Chapter 4, Environmental, Effects, as there are all outside the Focus Areas.

**RECREATIONAL ACTIVITIES**

The recreational activities occurring within the project area include a winter sports site, ten recreational events, eight outfitters and guides permits, and one vendor permit. The winter sports site, special use permit operates three ski lifts encompassing 420 acres of National Forest land. Environmental Consequences related to improvements within the winter sports site, special use permit boundary will be discussed in Special Uses section of Environmental Consequences in Chapter 4. Environmental Consequences related to recreation, visual and social/economic discussions will be discussed in the Recreation, Visual and Social/Economic sections of Environmental Consequences in Chapter 4.

Ten recreation events are permitted within the project area. Recreational participation and spectators are more than 5,000 people. Exact location and routes of the recreation events can be found in the individual special use permit folder. Discussion of Environmental Consequences for these special use permits can be found in the Recreation section in Chapter 4. The events include:

- **Seven Mountain Men Rendezvous - Second weekend in August:**
- **Winter Summer Games:**
- **Equestrian Endurance Race - Second & third week of June:**
- **Mountain Bike Race - Second & third week of June:**
- **Sixth Mountain Bike Events:**
- **Fat Tire Festival - July in Left Fork of Buckner Creek (Sat.), and Dark Hollow to Second Left Hand Canyon (Sun.) Race - July, various trailheads in and around Brian Head Town:**
- **Race - August, various trailheads in and around Brian Head Town:**
- **Fall Color Festival - September Left Fork of Buckner Creek (Sat. and Dark Hollow to Second Left Hand Canyon (Sun.).**
- **ATS Quo Archery Club:**
- **Midway Golf Shoot - June:**
- **Deer Valley Shoot - July:**
- **Mitchell Sawmill Tournament - August:**

Eight outfitters and guides are permitted to operate within the project area. These uses include guided fly fishing, big game hunting, road biking, and all-night off-road trips. Of the eight outfitter and guide permits, the fly fishing and big game hunting are district wide permits. This authorizes the holder to take clients on all waters and lands in the pursuit of fish and game.

One road taking permit is issued and administered out of the Powell Ranger District, Panguitch, Utah. The tour crosses the Cedar City Ranger District using State Highway 14 from Todd’s junction to Cedar City, Utah. Camping is not authorized under this permit.
The mountain biking outfitter and guide use in concentrated to the Forest Service trail system around Brian Head Peak. These outfitters are permitted to operate tours on these trails. The durations of the tours range from one to five days in length. Discussion of Environmental Consequences for these special use permits can be found in the Recreation section in Chapter 4. The Table 3-18 shows the breakdown of outfitter and guide permits.

### Table 3-18. Cedar City Ranger District Outfitter and Guide Permits

<table>
<thead>
<tr>
<th>PERMIT NUMBER</th>
<th>TYPE OF USE PERMITTED</th>
<th>TIME OF USE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5295</td>
<td>Big Game Hunting</td>
<td>State Hunting Seasons</td>
<td>District Wide</td>
</tr>
<tr>
<td>5426</td>
<td>Big Game Hunting</td>
<td>State Hunting Seasons</td>
<td>District Wide</td>
</tr>
<tr>
<td>9037</td>
<td>Big C-lane Hunting</td>
<td>State Hunting Seasons</td>
<td>District Wide</td>
</tr>
<tr>
<td>5506</td>
<td>Fly Fishing</td>
<td>12 Months/Year</td>
<td>District Wide</td>
</tr>
<tr>
<td>5416</td>
<td>Mountain Biking</td>
<td>August 25-29, 1997</td>
<td>Brian Head Trail System</td>
</tr>
<tr>
<td>5462</td>
<td>Mountain Biking</td>
<td>June 16-19, 1997 July 14-17, 1997</td>
<td>Brian Head Peak Road, Sidney Peaks Trail, Dark Hollow Trail, Highway 143, Second Left Hand Canyon, &amp; Sidney Valley Road.</td>
</tr>
<tr>
<td>5469</td>
<td>Mountain Biking</td>
<td>Summer</td>
<td>District Wide</td>
</tr>
<tr>
<td>5449</td>
<td>Road Biking</td>
<td>Summer</td>
<td>Highway 14</td>
</tr>
</tbody>
</table>

One vendor/peddler permit operates in the Midway parking lot during the summer months, and two weekends during the winter. The vendor/peddler permit represents a use that will not be impacted by either the Proposed Action or Action Alternatives. Therefore, it will not be discussed in Chapter 4, Environmental Effects, as it is outside the Focus Areas.

Table 3-19 and 3-20 show forty recreation and non-recreation special use permits, the permit numbers, and the type of permits that occur within the boundaries of the Spruce Ecosystem Recovery Project.
Table 3-2. Special Use Permits Within the Spruce Ecosystem Recovery Project (Non-Recreation)

<table>
<thead>
<tr>
<th>PERMIT NUMBER</th>
<th>TYPE OF USE PERMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>2085</td>
<td>Power Line</td>
</tr>
<tr>
<td>2104</td>
<td>Power Line</td>
</tr>
<tr>
<td>2132</td>
<td>Power Line</td>
</tr>
<tr>
<td>0517</td>
<td>EPMA Permit</td>
</tr>
<tr>
<td>1541</td>
<td>EPMA Permit</td>
</tr>
<tr>
<td>2440</td>
<td>EPMA Permit</td>
</tr>
<tr>
<td>2451</td>
<td>EPMA Permit</td>
</tr>
<tr>
<td>2456</td>
<td>EPMA Permit</td>
</tr>
<tr>
<td>5216</td>
<td>Amateur Radio</td>
</tr>
<tr>
<td>2068</td>
<td>Microwave Common Carrier</td>
</tr>
<tr>
<td>2192</td>
<td>Microwave Common Carrier</td>
</tr>
<tr>
<td>1006</td>
<td>Microwave Industrial</td>
</tr>
<tr>
<td>1224</td>
<td>Microwave Industrial</td>
</tr>
<tr>
<td>1031</td>
<td>Broadcast Translator/low Power TV &amp; FM</td>
</tr>
<tr>
<td>5100</td>
<td>Commercial Mobile Radio Service</td>
</tr>
<tr>
<td>2071</td>
<td>Telephone and Telegraph Lines</td>
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<tr>
<td>2078</td>
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</tr>
<tr>
<td>2101</td>
<td>Telephone and Telegraph Lines</td>
</tr>
<tr>
<td>2178</td>
<td>Navigational Equipment</td>
</tr>
<tr>
<td>1100</td>
<td>Irrigation Water Transportation Pipe, Less 12&quot; Diameter</td>
</tr>
<tr>
<td>1564</td>
<td>Water Transportation Pipe, Less 12&quot; Diameter</td>
</tr>
<tr>
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<td>Water Transportation Pipe, Less 12&quot; Diameter</td>
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<td>Weather Station</td>
</tr>
<tr>
<td>1011</td>
<td>Warehouse and Storage Yard</td>
</tr>
<tr>
<td>1512</td>
<td>Warehouse and Storage Yard</td>
</tr>
</tbody>
</table>

Maps for the special use permits listed above are contained in the individual special use permit folder located in the Cedar City Ranger District Office.

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CUMULATIVE EFFECTS AREA

The Cumulative Effects area for Special Uses will be the SERP area.

FIRE/FUELS RESOURCE

Based on the most recent publication concerning the fire ecology of forests in Utah (Bradley et al., 1992) the primary fire groups represented within the SERP area are Groups 10 and 12. Fire Group 10 is the "Dry, Lower Subalpine Habitat Types", the majority of the project area is within this type. Fire Group 12 is the "Colder, Upper Subalpine Habitat Types", high elevation forested stands north of Brian Head Peak appear to belong to this group. Refer to the Project File (Exhibit 30) for a thorough discussion of these fire groups by Bradley et al., 1992.

Fire activity in the spruce-fir forest type in the past has usually resulted in small fires which do not carry due to most of discontinuous fuels and burn only relatively small patches (1/4 acre or less). Fire has its greatest impact when occasional large, high severity fires invade from lower elevation forests during severe fire conditions. Periods of high wind and low fuel moistures present the greatest possibility for stand replacement fires. There is no indication that ground fires have burned through this area for several decades. No substantial (>100 acre) fires have occurred in this area in the last 75-100 years.

Four basic factors contribute to a stand's susceptibility to wildfire and the amount of change that a fire may produce in the stand or across the landscape. These factors are fire susceptibility of the different species within the project area, stand structure, existing fuel loading, and fuel moisture.

FIRE SUSCEPTIBILITY OF TREE SPECIES WITHIN THE PROJECT AREA

Bradley et al. (1992) provides a thorough discussion on how fire affects tree species found within the project area refer to Project File, exhibit 30). In general, the relative resistance of the primary tree species found within this project area to fire, from highest resistance to least resistance, is as follows:


Stands in the SERP area are dominated by the higher susceptible fire species such as aspen, spruce, and subalpine fir. Substantial mortality could be expected with even low to moderate intensity fires.

Aspen stands throughout the project area have been affected by fire suppression. Because fire suppression has been especially effective in aspen type, the ability for aspen to be stimulated by succkering from the effects of fire has been eliminated.

STAND STRUCTURE

Stands in the SERP area are generally multi-layered with Engelmann spruce dominating the upper canopy layer. A multi-layered canopy provides ladder fuels for ground fires to climb into the canopy, if fire conditions are favorable (dry fuels in drought years and strong winds). In stands north of Brian Head Peak, the high elevations (10,800 feet) and northerly aspects likely create conditions too cold for aspen, (except in limited microsites) placing these stands on Fire Group 12, under the mature forest category (Bradley et al., 1992). Fire in these stands would revert them to a grassland stage. Engelmann spruce and subalpine fir would re-invade the area, though the process would be slow depending on the severity and size of the burn and the availability of seed from the surrounding forest.

The remainder of the area falls into Fire Group 10, with aspen ranging from occasional to more than 50 percent, in some stands. Fire in these stands would revert them to a grassland stage with recovery to a forested stand occurring relatively rapidly due to aspen regeneration. Invasion of conifers would be slower depending on the severity and size of the burn.

Spruce Ecosystem Recovery Project DEIS
DEAD AND DOWN FUEL LOADS

There is little data available on the amount of down woody material present in the SERP project area. However, many stands in Cedar Ridge (south of Cedar Breaks National Monument) are similar in composition and age; down woody material in these stands averages 13.0 tons/acre. The majority of the material is large in diameter (4 to 22 inches) which would result in a relatively low rate of spread for ground fires, but an overall high fire frequency rating, on some cases greater than 200 BTU's/season (81, 600 - predicted by BEHAVE software for fire projections).

Due to the recent beetle and other insect and disease activity, the number of standing dead trees has been increasing. Stand data indicates that the number of standing dead per acre ranges from 0 to 200 with the average being about 30 per acre. Stands with the greatest concentrations of snags are: 208/12, 32, 23, 34 and 11/08, 47, 47, 47.

FUEL MOISTURE

Fuel moisture in the spruce/white fir type is typically higher than other forest types due to the high elevation and amount of precipitation. Most of the stands in the SERP area are multiaged and have a relatively high canopy closure. These factors help to maintain a high fuel moisture content, lowering the risk of fire starts in most years. However, in dry years when fuel moisture is low, fire starts can occur, though less frequently than in mixed conifer or pine types.

WILD LAND URBAN INTERFACE

Since the end of World War II, the United States has been under going rapid socio-economic changes: populations have increased, leisure time has been on the increase, per capita income has been rising, and social pressures are becoming intense in urban centers. These factors have led to an increase in the demand for recreational and permanent home sites in the wildland areas of Utah. In an effort to keep the atmosphere surrounding their homes in harmony with the outdoor setting, owners have not cleared brush and vegetation away from these properties. This failure to provide for adequate fuelable space for fire around homes has increased the susceptibility of the homes to loss by fire. Defensible spaces are defined as fuel breaks around structures. The size of these fuel breaks are defined by the State of Utah, Department of Lands and Forestry Report: "Wildfire Hazards and Residential Development." The State of Utah recommends a minimum clearance of thirty feet and a maximum of seventy five feet of native vegetation around structures. Most of the structures in the recovery project area do not meet these standards (Per Comm 12/14/84).

Brian Head Town currently has approximately 90 cabin type structures and 50 multi-family (condominium) type structures. The reported population is approximately 100, but can be over 5000 during times of special events. The resort community continues to grow with an average of two to three cabins per year being built. Brian Head has maintained a good fire hydrant system with a hydrant within 1000 feet of most structures. Water supply is also in good shape; with a reserve of approximately two million gallons. Unfortunately some of the access roads to structures are not suitable for all fire suppression equipment. The roads do not have turn at dead ends and/or are too narrow for fire suppression equipment. The lack of adequate roads would contribute to an increased response time (Per Comm. D. Harris. Brian Head Town Fire Marshal 12/14/84).

A similar situation exists in the Rainbow Meadow Ranchos, Ireland Estates, and Meadow Lake Subdivisions. Approximately 600 summer homes/cabin are present in these two areas. Fire suppression responders are essentially the Forest Service with possible assistance from Brian Head Town. The lake in the Meadow Lakes Subdivision is available for suppression activities. Smoke mortality has or is presently affecting areas within and adjacent to these subdivisions.

The suppression of wildfire in areas with this type of fuel loading (Dead fuels greater than 15 tons an acre) is very difficult and the possibility of larger, catastrophic wildfires is greater. Forest Service Manual (FSM 5131.1) provides direction for structural fire protection from advancing wildfire within the National Forest Boundary. Structural Fire: Structural fire fighting is the responsibility of local fire service agencies. Structural fire protection from advancing wildfire within the National Forest Boundary is the responsibility of local fire service agencies.

AIR QUALITY

The project area and the entire Dixie National Forest is designated as a Class II area. This means that air quality exceeds the National Ambient Air Quality Standards. Class II airsheds may incur moderate increases in new pollution.

Class I areas are geographic areas designated for the most stringent degree of protection from future degradation of air quality. The broad National goal for these areas is to prevent any future impairment of visibility. This goal however, is broad enough to include regulation on use of prescribed fire and resultant smoke. The smoke from outside Class I airsheds, must be minimized and managed using the concept of, Best Available Control Technology, and comply with interagency smoke management guidelines.

There are no Class I airsheds within 5 miles of the project area. The closest Class I airsheds are Zion National Park which is approximately 20 miles from the southern edge of the project area and Bryce Canyon National Park which is approximately 30 miles from the eastern edge of the project area.

Other Class II airsheds within Southern Utah include:

- Arches National Park- Approximately 188 air miles
- Canyonlands National Parks- Approximately 186 air miles
- Capitol Reef National Monument- Approximately 97 air miles

There are several subdivisions, Brian Head Ski Resort, and one Wilderness Area within 5 miles of the project area. Those areas are listed below and will constitute smoke sensitive avoidance targets within the project area. These are five parameters important to the determination of air quality, and its potential effects. These include amount of airborne particulates, gaseous pollutants, visibility, Prevention of Significant Deterioration (PSD) Designation, and proximity to residential private subdivisions and Class II airsheds.

Long term visibility impairment from human activities will not impact long term baseline visual range more than five percent of the 90th percentile scean days in Class I airsheds. nor more than 10 percent in Class II airsheds

Short-term (14 days) visual range impairment from human activities outside the airshed such as prescribed fire smoke would not impact the pre-activities visual range more than 10 percent of the 90th percentile in Class I airsheds or 20 percent in Class II airsheds. This allows for the natural role of fire and smoke from prescribed natural ignitions to maintain the ecosystem (Desk Guide Bridge to Revision, USDA Forest Service, Intermountain Region, 1983).
No visibility measurements have been made in the project area. Information received on baseline visibility for areas within the Colorado Plateau indicate that the average visibility, for clear days, is 1.45 kilometers or approximately 92 miles. (Personal conversation with Cliff Benoit, Regional Air Quality Specialist, 3/1/95, based on Interagency Visibility Monitoring Data, and the IMPROVE computer model).

For each criteria pollutant, EPA (Environmental Protection Agency) is required to designate a concentration level above which the pollutant would endanger public health or welfare. To date, NAAQS (national ambient air quality standards) have been established for six criteria pollutants: sulfur dioxide, particulate matter PM-10, carbon monoxide, ozone, nitrogen oxides, and lead. The concentrations of total suspended particulates (TSP) and particulate matter smaller than 10 micrometers (PM-10) are not monitored within the project area. Primary emission sources that would contribute to particulate levels would be automobile exhaust, and emissions from wood burning stoves from Bear Head Ski Resort and adjoining subdivisions. Prescribed burning by the Forest Service or private owners has not been a common practice within or adjacent to the project area.

An emission factor for particulate matter (EFPM) is defined as the mass of particulate matter produced per unit mass of fuel consumed. Emission factors reported in literature for forest fuels range from four to 180 Btu, depending on fuel type and arrangement and the manner of combustion. For piled or windowed slash an Emission Factor of 50 Btu is used.

Emission rate is defined as the amount of smoke produced per unit of time (lb/minute or grams/sec). Down wind concentrations of particulate matter in smoke are related directly to the emission rate at the fire source. The emission rate in turn is affected by the amount of fuel being burned, the rate at which it burns, and the emission factor of the fuel. Smoke Management Guidelines for Prescribed Fires, Maritime-Flathead National Forest, 3/92.

No measurement of other criteria pollutants, such as carbon monoxide, sulfur dioxide, ozone, nitrogen oxides, or hydrocarbon were made in the project area.

There are no Class I ashes within 5 miles of the project area. The closest Class I ashes are Zion National Park which is approximately 20 miles from the southern edge of the project area and Bryce Canyon National Park which is approximately 80 miles from the eastern edge of the project area.

Other Class I ashes within Southern Utah include:
- Arches National Park - Approximately 100 miles
- Canyonslands National Park - Approximately 160 miles
- Capital Reef National Monument - Approximately 90 miles

There are several subdivisions:
- Bear Head Ski Resort, and one Wrangellia Area within 5 miles of the project area.
- Those areas are listed below and will constitute smoke sensitive avoidance targets within the project area.

- Cedar Breaks National Monument
- Rainbow Meadows Subdivision
- Ashdown Grove Wilderness
- Brian Head Town
- Ski View Estates
- Green Meadow Acres
- Cedar Breaks Mountain Subdivision
- Timbercrest Subdivision
- Summit Mountain Subdivision
- Sky Haven's Chairs
- Meadow Lakes Subdivision
- Castle Valley Private Land
- Blue Spruce Subdivision
- Navajo Lake Campground and Cabins

**Spruce Ecosystem Recovery Project DEIS**

**Affected Environment**

- Panguitch Lake Store and Cabins
- Mammoth Creek Subdivision

All subdivisions and the town site have private residences within their boundaries.

**CUMULATIVE EFFECTS AREA**

The Cumulative Effects Area for air quality will consider the area extending west to Sugar Loaf Mountain, north to Horse Valley Peak, east to the Mammoth Creek subdivision, and south to Navajo Lake. Effects to the closes: Class I ashes, Zion National Park and Bryce Canyon National Park will also be considered. All other Class I ashes identified above would not be measurably affected by the actions proposed in this project and therefore will not be carried into Chapter Four. See Appendix 10.

**RANGE RESOURCE**

**ALLOTMENTS**

The project area includes the following grazing allotments: Bowery CH, Warren-Bunker S&D, Dry Lake-Bunker CH, Dandelion Knoll CH, Rainbow Mountain Valley P&G, Six Lakes-Navajo Ridge S&G, Red Desert CH, Sage Valley-Horse Valley S&G, and Deer Valley S&G.

There are two main trading corridors through the project area. The Dandelion Knoll, Six Lakes-Navajo Ridge and Warren-Bunker helds trail from Dry Lakes over Navajo Ridge, Mammoth Summit and on to their respective allotments. These trails use this trail to and from the higher summer pastures.

The Hayscock Mountain-Brunhead and Sage Valley-Horse Valley sheep trails are matted to Hayscock Min. and Clear Creek in the early summer. In mid-July the Sage Valley-Horse Valley band trails from Clear Creek to Blowhard. In mid-August the Hayscock Mountain-Brian Head band trails from Hayscock Mountain by way of Clear Creek to the Brian Head Peak area. Finally, in late September the Sage Valley band make the return trip over the trail to Horse Valley.

On the cattle allotments, improvements consist of allotment boundary fences, a few reservoirs to improve livestock distribution, and interior fences to control the cattle. Fences that are located within the project area are the Red Desert/Warren-Bunker boundary fence, the John E. Flat pasture boundary, Deer Creek/Bunker Creek pasture boundary, Dry Lake-Bunker Creek/Warren-Bunker allotment boundary fence, Bowery/Warren-Bunker boundary fence, and Bowery allotment boundary fence.

The Bowery cattle allotment encompasses the north portion of the project area. There are 14,818 acres in the allotment. It includes Center Creek and Bowery Creek drainages. There are 160 cattle permitted on the allotment for three months grazing season. The season ranges from June 21 to September 20. There are nine permittees who graze cattle on the allotment. They are part of the Bowery Cattleman’s Association in Parowan, Utah. The allotment is managed under a modified deferred rotation grazing system. There are three pastures on the Bowery allotment. The Dark Hollow pasture is located in the project area.

The Warren-Bunker sheep allotment consists of 7,425 acres of which 4240 is classified as suitable. It is managed under a deferred rotation grazing system. The sheep graze from Hayscock Peak to Clear Creek one year and the opposite was the next. There are 980 sheep permitted on the allotment for a 71/2 to 9/20 grazing season. The permittees have his base operation in Parowan, Utah.

The Dry Lake-Bunker cattle allotment involves 13,674 acres. Approximately 6,897 are suitable for livestock grazing. There are 105 cattle permitted on the allotment. The season of use is from June 16 to September 30. There are two permittees who graze cattle on the Dry Lake-Banker allotment and their base operation is in Panguitch, Utah. The allotment is grazed under a modified deferred rotation grazing system. The cattle enter the allotment in the Dry Lake pasture which is outside the project area. The cattle leave Dry Lake and go into Deer Creek and

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includes all of the following allotment boundaries: Bowery, Warren-Bunker, Dry Lake Bunker, Haycock Mountain-Brian Head, Dandelion Knoll, Hatch Mountain-Castle Valley, Six Lakes-Navajo Ridge, Red Desert, Sage Valley-Horse Valley, and Deer Valley (Appendix 10).

TRANSPORTATION

ARTERIAL ROADS

Primary access to this analysis area is provided by three state highways. The designation of these highways are: Utah State Highway 14 (U-14), Utah State Highway 143 (U-143), and Utah State Highway 148 (U-148).

UTAH STATE HIGHWAY 14

Utah State Highway 14 connects Cedar City on the west with US-89 on the east. U-14 is a mountainous highway with sharp curves and steep grades. This highway is state maintained. During winter months it can become impassable for short periods of time, in summer months it can be quite busy with recreational traffic. State highway 14 has also been designated as a scenic byway.

UTAH STATE HIGHWAY 143

Utah State Highway 143 connects Panguitch on the east with Parowan on the west. It is also a mountainous highway with sharp curves and steep grades. This highway can also become impassable for short periods of time. During summer months it is quite busy with recreational traffic U-143 is also maintained by the state highway department. This highway has also been designated as a scenic byway.

UTAH STATE HIGHWAY 148

Utah State Highway 148 connects U-14 to U-143 thru Cedar Breaks National Monument. This road has many of the characteristics of the above highways. The travel way of this highway is narrower that than U-14 and U-143. U-148 is also maintained by the state highway department. This highway is also designated as a scenic byway.

All of the above highways provide access to the Cedar Breaks National Monument and Brian Head areas.

COLLECTOR ROADS

FOREST ROAD 3008

This road connects U-143 (Sidney Valley) to U-143 (near Parowan). The segment of 3008 from U-143 north approximately seven miles was reconstructed and surfaced during the field season of 1995. This portion is now reconstructed to a minimum width of fourteen width with intersevireal turns. The segment from the end the reconstructed section to the point where it connects to U-143 near Parowan, consists of steep grades, sharp curves and narrow travel way. This travel way consists of native material and drainage devices are essentially non-existent.

Other collector exists within the analysis area but no inventor has been made.

These other collector roads are assumed to be in various conditions, ranging from poor to good. Maintenance levels of these roads range from level 2 to level 4.

LOCAL ROADS

Access into the more remote parts of the analysis area is provided by local roads. The condition of these roads ranges from good to fair. A portion of these roads have been constructed or reconstructed with surfacing. The others consist of native material travel with little or no drainage devices installed. Maintenance levels of these range from level 1 to level 3.

With the information available at this time the analysis area consists of 52,991 acres or 82.8 square miles with 201 miles of existing road. This would give an average road density of 2.45 miles of road per square mile.

These figures were obtained from USGS data and maps. It is believed that not all roads in this analysis area have been inventoried and submitted to USGS.
At present, none of the roads in the analysis area have been identified as qualifying for RS 2477 designation.

**CUMULATIVE EFFECTS AREA**

See Appendix 9 for a map displaying the CEA for the transportation resource.

**CHAPTER FOUR**

ENVIRONMENTAL CONSEQUENCES
CHAPTER FOUR
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The affected environment is that area, in and around the project area, that could experience physical, biological, social and/or economic consequences resulting from the implementation of the Proposed Action, or the alternatives to the Proposed Action. In most cases, the environmental effects of the alternatives could extend beyond the actual acres where activities occur. The affected environment is different for each resource, and the area affected and analyzed is called the analysis, project and cumulative effects areas.

The analyses contained in this Chapter is based on the implementation of design criteria and mitigation measures cited in Chapter Two.

In Chapter Three the existing conditions for the project area, by resource, were described. In this Chapter the consequences of the Proposed Action and alternatives to the Proposed Action, including the No Action Alternative, will be compared and discussed. Where it was considered helpful to the understanding of the discussions, the Dixie National Forest Land and Resource Management Plan (Forest Plan) direction is listed as a basis for the site specific guidance.

VEGETATION RESOURCE

The discussion of how each alternative affects the vegetation resource will cover the same subsections as discussed under the Vegetation Section in Chapter Three. The effects of fire and timber harvesting on the vegetation characteristics can be found in the white paper in the Project File, exhibit 17 (Eschelhammer and McGinn 1997). The following discussion includes more detailed site specific information not contained in the white paper.

In the analysis of the proposed activities in the Brian Head EIS, 1995, modeling using the Forest Vegetation Simulation (FVS) system was used to simulate the conditions that would likely exist in the future using 1991 stand actual age data. Results were based on evaluations by Forest Health Protection (FHP), other sparse beetle outbreak areas on the Dixie National Forest and documented records of past spruce beetle outbreaks in Utah, Colorado, and other locations (Schmidt and Hinds 1973). Simulation results were generally believed to be "worst case" assuming no other natural factors intervene as small locations and the effects projected are stand averages.

Simulation results are located in the Project File (Exhibit 17). This "worst case" scenario has largely taken place within the northern portion of the SRF area. Field observations and stand exams in 1996 confirmed that spruce beetle populations have continued to infest spruce trees in the project area. This has caused a major shift in vegetation attributes to early seral stages in the affected area. This trend is expected to continue throughout the SRF area until the food source is consumed by the beetles. "Sparse beetle populations are expected to remain in the outbreak phase until the spruce food source is depleted. Unless natural factors such as tree or fire cause the spruce beetle populations to collapse. At the present rate of infestation, it could be an additional 10-15 years before the sprite beetle populations collapses on the Dixie City Ranger District (Project File, exhibit 18).

VEGETATIVE STRUCTURE

Stand structure and canopy closure are described below as related to the recommended vegetation structures (VSS) used in this model for the UHS and USFS landscapes. The VSS system was initially developed by Reynolds and Amsden, 1996 which provides recommendations for distribution of vegetative structural stages (VSSs) within the context of a landscape. The VSS system was initially developed by Reynolds and Amsden, and was used by Amsden to help describe the properly functioning condition (PFC) of the vegetation resource. The VSS system, classifies the successional stages (ie. Young Forest, Mid aged Forest, etc.) of the individual stands within a forested ecosystem based on the dominant size class of the tree species. The Dixie National Forest is currently planning on the intent of the VSS portion of the goshawk recommendations to analyze the changes in structure caused by both the spruce beetle and the proposed activities. However, as discussed in Chapter
This primarily reflects the heavy bark beetle mortality that occurred in the early 1990's in Sidney Valley and Rainbow Meadows, plus regeneration treatments in Deer Valley, Tippets Valley, and Lowder Creek.

The majority of the Mature and Old Forest acres in the CEA are located in the Coal Creek, Parowan, and Panguitch watersheds (Project File, exhibit 17). A relatively large block is located in the Radar Ridge project area (proposed), other areas are the area northwest of Sidney Peaks, near Brian Head project area, and east of Sidney Valley, near Bunker Creek.

Most of the Mature and Old Forest stages, where they exist, do appear to have canopy cover greater than 40% (B/C). The desired canopy cover for a Mid-Aged (12-18 inches diameter) Forest stage depends on the presence of a goshawk nest. If a nest is present in the vicinity, more C (> 60%) canopy cover is desired. Based on available data, most of the existing Mid-Aged Forest falls into an A or B (< 60%) cover class, based on stand averages.

Removal of beetle infested trees and reduction of basal area where it exceeds 100 sq. ft. in the Hancock Peak Focus Area, could result in the retention of more live trees per acre and the maintenance of the existing VSS. Within 50 years, the project area would begin developing acres dominated by the presently deficit older stages, moving toward desired structural and canopy cover conditions. Table 4-1 shows the existing aspen forest structural condition within the project area and the changes anticipated by the alternatives. The VSS's in the aspen forest will be moved toward the desired or properly functioning condition by reducing the representation of the older VSS's and increasing the younger VSS's in all action alternatives.

<table>
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</tr>
<tr>
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<td>17</td>
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</tr>
<tr>
<td>Alternative B</td>
<td>19</td>
<td>80</td>
<td>1</td>
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</table>

**NO ACTION ALTERNATIVE**

DIRECT/INDIRECT EFFECTS: Continued spruce mortality will result in a decline in average spruce diameter in the SERP area, since many of the larger trees will likely be killed. Average diameters would be expected to continue to decline until spruce beetle populations subside. Average diameter of all trees would continue to decrease, reflecting the increase in seedlings and saplings as natural regeneration begins filling in openings. The No Action Alternative could most affect the Hancock Focus Area by not reducing densities to test against spruce beetle risk. The stands in this Focus Area could become infested more extensively and reduce the VSS's in those sites. Not implementing treatments in Hancock Peak could result in the lost opportunity to apply proven silvicultural treatments in other green, un-infested areas and the subsequent further loss of the older VSS's in the SERP area.

This alternative would result in the continued successional trend of the aspen forests toward the late seral stages, which is away from the desired or properly functioning condition.

Under No Action, by 2000, it is expected that the B/C cover class would be generally lost at a stand level (clumps of trees would remain though they may consist primarily of subalpine fir instead spruce), except in some aspen and subalpine fir dominated stands. Larger sized trees would become more scattered, decreasing overall canopy cover into primarily the A cover class. This trend would be expected to continue until spruce beetle populations declined. Development of the B-C cover class (in other than aspen and subalpine fir dominated stands) over time would tend to be slow, since the majority of the larger spruce would be expected to be killed under this alternative.

**ALTERNATIVE A**

DIRECT/INDIRECT EFFECTS: The effects on structure under Alternative A would be very similar to those described for the Proposed Action because the treatment sites in the Spruces Focus Area are currently or expected to be extensively infested by spruce beetles. About 321 acres would not be artificially reforested and 143 acres of
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It is expected that in the next five years, the loss of the old growth spruce-fir forests will continue because of the spruce beetle mortality. Silvicultural treatments in green, untested stands may maintain old growth in the project area or create conditions where old growth will establish in the short term. The treatments in the Hancock Peak Area will provide information to assist in this determination.

NO ACTION ALTERNATIVE

DIRECT INDIRECT EFFECTS: Under No Action, it is estimated that the loss of stands meeting minimum old growth characteristics will continue for at least five years. Projections are difficult but if the current trend continues the amount of old growth in the SERP area may be less than one percent of the forested areas within five years. Development of old growth characteristics in other stands would be slow due to the expected loss of the large space over much of the project area. Overall, space is the species that has the capability of growing to the desired and lives long enough to develop the structure associated with old forest stands.

CUMULATIVE EFFECTS: With No Action the amount of old growth in the project area may be reduced to less than one percent within five years, which is less than the desired 5-10 percent old growth on a watershed basis. Recovery to the desired level would be slow due to the loss of more large spruce per acre. This alternative would not allow for implementation of treatments designed to maintain old growth status or create conditions where old growth will establish in the short term.

STAGS, DOUGS LOGS, AND WOODY DEBRIS

Stags, down logs, and other woody debris are important for maintaining forest structural diversity and soil productivity. Retention of stags and woody debris was addressed in the Forest Plan (1975-26/80/414/30/418). The Forest Plan does not specifically address retention of woody debris for site productivity, but Harvey et al. 1987's recommends managing for a minimum of 10-15 tons acre of large greater than 3 inches

Aspen would not be regenerated. The primary difference is the 1.183 acre Chicken Head Focus Area where the stand will remain in the current condition with the trend toward late successional or older stands which move away from the property boundary condition. Up to 362 acres of aspen and 739 acres of spruce-fir would not be regenerated.

CUMULATIVE EFFECTS: Refer to Proposed Action for information on existing conditions in the CEA.

The cumulative effects of Alternative A would be very similar to the Proposed Action. The rate of reforestation in the Spruces Focus Area would be delayed at least 10 years which would result in a corresponding delay in the establishment of older stands. Similarly, the aspen forests would continue the successional trend toward late-serial or older stands. To attain the desired structure distribution in the aspen forests, it would require treatment of a similar nature and size in other locations within the SERP area.

ALTERNATIVE B

DIRECT INDIRECT EFFECTS: Exclusive of the Roadless Area Focus Area implementation of Alternative B would have the same effects on structure as the Proposed Action. The difference is within the 2,792 acres in the Roadless Area the structure would remain in the projected conditions while the dead spruce-fir and aspen forests. This would result in a delay in the rate of reforestation and the subsequent reestablishment of older stands in the spruce-fir forest.

CUMULATIVE EFFECTS: Refer to Proposed Action for information on existing conditions in the CEA.

The cumulative effects of Alternative B would be very similar to the Proposed Action. The 587 acres of aspen and 2,235 acres of spruce-fir within the Roadless Area Focus Area would not be burned and a delay in the establishment of older stands would result.

OLD GROWTH

The Forest Plan FSG CO through C06315-1 states that 7.0% of the forested areas within a drainage should be managed to meet old growth characteristics and structure. In 1990, the Forest implemented the policy to maintain a minimum of 7.0% of each project area analyzed as old growth defined by Characteristics of Old Growth Areas as documents and field observations. The estimates of old growth existing in the SERP area includes the effects of the spruce beetle from 1995. It is estimated that up to 6.059 acres (18%) of forested stands meet the old growth characteristics. The loss of large-sized stands in stems due to bark beetle activity is the primary reason many stands do not meet the structural characteristics of old growth.

PROPOSED ACTION: ALTERNATIVES A AND B

DIRECT INDIRECT EFFECTS: Under the Action Alternatives, exclusive of the Hancock Peak Focus Area, no treatment has been proposed in any stands meeting old growth characteristics. Several stands within the Hancock Peak Area was determined to meet old growth characteristics in 1990, however, based on field studies conducted in 1997, it was determined that the spread of the spruce beetle into this area has effectively changed the stand characteristics so that they no longer meet the requirements of old growth. However, if a green component can be maintained in this area the stands may return to old growth status within the short term. Without treatment, these sites are at a higher risk to spruce beetle infestation and old growth status may be lost in the long term.

CUMULATIVE EFFECTS: Due to incomplete stand exam data over the CEA, it is unknown exactly how many acres of old growth characteristics exist in spruce-fir type. In order to evaluate changes in the existing effects, we have not developed scenarios. Old growth characteristics do not exist assumptions were made based on apparent vegetative structural stage. Aspect was used to determine whether a stand should be rated as old growth or scarred/moribund. (Refer to the Project File, exhibit 17 for additional information.

Based on these assumptions, it was determined that overall about 17.7% of the CEA can be rated as old growth. Of the projected area of old growth, the Aspen Creek and Mammoth Creek watersheds have the most spruce-fir acres rated as old-growth and the Aspen Creek and Mammoth Creek watersheds, the least.

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Fast harvest activities did not require the retention of down logs or large down woody material. Overall, in past treatment areas (before 1990) large, down woody material is lacking. It is generally present to some degree, but is smaller in diameter than desired. Overall, it is assumed that stands generally meet the desired 5 tons/acre and most of the down logs are 10 tons/acre. An exception to this is the clearcuts in the Deer Valley sale and the forested strips in the Brian Head ski area, where only about 5 tons/acre are assumed to exist.

Implementation of the Proposed Action would move toward meeting desired conditions in the CEA by leaving the desired number of snags, down logs, and down woody material over most of the treated areas. Exceptions would occur where this material is not left in order to meet other objectives (i.e. safety).

**NO ACTION ALTERNATIVE**

**DIRECT INDIRECT EFFECTS**

Under No Action it is expected that most stands would have a sufficient number of dead trees to meet or exceed desired conditions for three large snags, 5 large logs per acre, and five or 15 tons of down woody material within 5-10 years. At some point, it is likely that most areas would have an excess of down material caused by the eventual breakdown of snags. This would result in damage to remaining trees, reduced natural regeneration, and increased wildlife hazards.

**CUMULATIVE EFFECTS**

Refer to the discussion under the Proposed Action for information on existing conditions over the CEA. No Action would contribute to an increase in the number of large snags and eventually 15-20 years in number of down logs and tons of down woody debris. The concern under this alternative would be the excessive buildup of woody material, which would exceed the desired 10-15 tons/acre, inhibiting regeneration and damaging remaining trees.

**ALTERNATIVE A AND B**

**DIRECT INDIRECT EFFECTS** Implementation of Alternative A and B would have similar effects on number of snags, number of large down logs, and tons of down woody material as described under the Proposed Action. Since the same mitigation measures would be used to meet objectives.

**CUMULATIVE EFFECTS** Implementation of Alternative A and B would have similar effects as described under the Proposed Action. Since the same mitigation measures would be used to meet objectives.

**VEGETATIVE COMPOSITION**

**NON-FOREST TYPE (11,209 ACRES)**

As described in Chapter Three, non-forest areas include grassland, shrubland, and wet meadows greater than five acres in size. Also included are wet areas in forested stands though they may be less than five acres in size. In all action alternatives no-vegetation areas would be established around these wet areas for protection.

**ALL ALTERNATIVES DIRECT AND INDIRECT EFFECTS**

There would be no effects on the non-forest stands under these alternatives in all of the vegetative attributes and so will not be discussed in subsequent vegetative characteristics.

Small upland areas located within forested stands could be affected if tree mortality has or will occur in the vicinity of these areas. The decrease in canopy closure would result in increased light and moisture, allowing the understory vegetation to increase.

**CUMULATIVE EFFECTS**

Many meadows and rock stands are located throughout the CEA. Dry meadows are utilized by both livestock, wildlife, and recreational users. The edge between meadows and forest cover is used extensively; some trees can be used for shade and cover. The impacts of grazing and trampling from livestock and wildlife trampling or vehicle use from recreational users.

As in the rest of the CEA, the major uses of non-forested stands in the project area are livestock, wildlife, and recreational uses. Livestock and wildlife use has been relatively constant, but recreational use in the project area is increasing. (Refer to Chapter Four, Recreation and Livestock Grazing for additional information on use patterns).

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**FORESTED AREAS (37,572 ACRES)**

Habitat type classification would remain the same under all alternatives, since it is based on potential climax vegetation, not necessarily species that are present at different points in time. Changes in overstory canopy closure and density would be expected to occur in the understory trees, shrubs, grasses, and forbs. The effects of the different alternatives on the two primary habitat types in the project area will be discussed. It was assumed that when a stand fell below 30% canopy closure there would be sufficient light and moisture reaching the ground to allow understory vegetation to measurably respond in open areas. Other stands that retained more than 20% canopy closure would have increases of understory vegetation, primarily in open pockets, resulting from spruce beetle mortality. Table 7 (Chapter 3, Habitat Types section of the Brian Head EIS) lists the understory species common in each habitat type which would increase in response to a decrease in canopy closure.

**PROPOSED ACTION AND ACTION ALTERNATIVES**

**DIRECT AND INDIRECT EFFECTS**

Under the Action Alternatives, exclusive of the Hancock Peak Focus Area, harvest treatments would occur in areas with spruce mortality in excess of 70 percent. Subsequent year's beetle flights are expected to kill most of the remaining hosts so the proposed timber harvest will not appreciably affect the green canopy. The timber harvest will essentially reduce the number of snags and subsequntly increase in fuel loading. Small areas that contain non-host species (aspen/fit) will retain a greater than 20 percent canopy closure and timber harvest will have little effect on their composition. The effects of the spruce beetle mortality is expected to reduce the canopy closure to below 20 percent which will result in an increase in understory vegetation. The effects of timber harvest will reduce the canopy closure of the dead trees which will result in a small increase in sprouting of shrubs, forbs and grasses over no treatment. Recovery to pre-harvest canopy closure levels would take 80-100 years.

Aspen would also begin to regrow in greater amounts in these areas due to additional light and the subsequent disturbance caused by harvest operations. Planting of spruce seedlings would also occur in some open areas in the action alternatives, which would maintain spruce in the stands through time and accelerate the rate of reforestation by about 10 years (McCaugh et al. 1991). It is also anticipated that a greater percentage of larger spruce would survive in the Hancock Peak Focus Area due to sanitation treatments, compared to No Action.

The effects of fire on composition is a function of fire severity. The objective of the burns is to encourage a mixed severity fire regime which will produce vegetation mosaics. The areas that are or have been inhabited with spruce beetles will probably burn more severely than green canopy and aspen areas. This should accelerate the rate of reestablishment in the spruce beetle affected areas compared to No Action because of the increased exposure to mineral soil (Peet 1991). In areas where a green forest exists, the fire severity will generally be lower or a mosaic pattern of lightly burned vegetation will be created.

**CUMULATIVE EFFECTS**

The vegetation CEA contains 37,572 forested acres. Based on the SERN data base, most of the CEA would fall into a triplo-lawsine (A/B/A) series. The most common phases would likely be Betula papyrifera (B/A/B/A) on steeper, drier mid-slopes and Ribes montanum (A/B/A/B) on more moist sites. PIEM/RIMO is the only Englemann spruce habitat type identified in this area. It is found on the highest elevation sites in the CEA. This habitat type is known to occur in Brian Head, Sidney Valley, Rainbow Meadows, and Bunker Creek. These stands are the most affected by the spruce beetle because of the lack of non-host species. Spruce beetle activity has been detected in all of these areas (FPL aerial survey maps 1991, 1996. Project File exhibit 13). Stands in the A/B/A habitat type are also affected; the degree of change depending on the amount and size of spruce in the stand.

Overall spruce beetle, along with some harvest prescriptions, has reduced the proportion of spruce over the landscape. Intermediate harvests usually tend to favor subalpine fir, since it can germinate and grow in shadier conditions than spruce or aspen. Recent harvests of planned harvests have also reduced the percent spruce in order to reduce risk to bark beetle outbreak. Spruce has been or will be planted in some areas to maintain the species in the stands (e.g Deer Valley, Lower Creek, Rainbow Meadows, Sidney Meadows, Brian Head).
Ou outbreak would likely take 80-100+ years depending on the size and number of trees remaining after bark beetle populations subside. (FSN Terms: Project File: Exhibit 17)

Most stands classified as ABLARMEM have also been reduced below 20 percent canopy closure by the spruce beetle. This will result in increases in shrubs, forbs and grases. Aspen would also begin to respond in greater amounts. Shrubs, forbs and grases would increase until the tree canopy begins closing, decreasing the amount of water and light available to understory vegetation. The small areas within the Focus Areas with a mix of spruce, subalpine fir, and aspen would generally meet or exceed pre-outbreak canopy closure levels within 30-50 years.

Non-intensified stands in management-sentinel fire Focus Areas would continue the successional trend toward late seral conditions. Conifer representation will continue to increase at the expense of mostly aspen. Insect and disease activity will continue to increase which will reduce forest health, growth and increase the probability of stand replacing wildfires fires.

Cumulative EFFECTS: No Action will result in the slowest rate of reforestation in the timber harvest Focus Areas. The habitat type most affected is the SPIEN/REHED habitat type stands would also be affected; the amount of change would be proportional to the amount of spruce present. Due to spruce beetle mortality, it is estimated that up to half of the affected area at 5'000 acres have already fallen below a 20 percent canopy closure. This is in addition to the estimated 603 acres estimated to be dead in the (Grand Forb) subalpine stage in the CEA. This would total about 12% of the forested area in the CEA. However, with spruce beetle populations expected to remain high for the next 5 years in the CEA, it is possible that the Grand Forb subalpine stage could easily exceed 20 percent of the forested areas (Refer to Chapter Four, Structure, Pattern and Processes for additional information). The action alternatives will all accelerate the rate of reforestation by at least ten years (McCaffrey et al. 1991) which will move stands more rapidly into large, structural stages.

VEGETATIVE PROCESSES

INSECTS AND DISEASES

As discussed in Chapter Three, the spruce beetles will be the only insect and disease identified in project area discussed below. The Forest Plan direction for managing insects and disease populations is:

Present or suppress epidemics insect and disease populations that threaten forest stands with an integrated pest management approach consistent with forest management objectives (Forest Plan IV-55 (FSN 1)).

This is a Forest-Wide Standard & Guideline and since no others supersede it for MA's 1B, 2B, or 10B, it also applies to these areas.

Presently bark beetle populations are at outbreak levels in the project region (Munson 1997). The effects of this insect are a major concern of the District since continued spruce beetle activity could have major changes on vegetative characteristics. To minimize duplication, projected changes in vegetative attributes will be discussed in other sections. This section will focus on the effects of each alternative on spruce beetle populations.

PROPOSED ACTION AND ACTION ALTERNATIVES

DIRECT EFFECTS: Implementation of the Proposed Action and Alternative B would use sanitation, salvage and improvement harvests to reduce spruce beetle populations on about 2,872 acres in the project area with prompt cutover. The proposed project would be from 100-200 acres of the CEA.

Removing infected hosts would reduce local spruce beetle populations where treatment occurs. Sanitation cuts destroy immense susceptible hosts and reduce stand densities, may reduce the risk of further loss of the residual spruce component.

CUMULATIVE EFFECTS: The heaviest mortality is occurring in the northern part of the CEA including the northern portion of Cedar Breaks National Monument. Heavy mortality has also been observed in the Hancock Peak area.

Recent timber sales within the project area total 3,600 acres. Implementing the Proposed Action would encompass removing bark beetle infested trees and reducing stand risk to meet site objectives on up to 2,872 acres. This would increase 2,551 acres.

PROPOSED ACTION: The Proposed Action would use the following harvests:

- Salvage and improvement harvests on about 2,872 acres in the project area with prompt cutover.

NO ACTION: The NO ACTION alternative would not affect the project area and would allow natural processes to continue to affect the project area. The Project would not be affected by the Project area.

DIRECT EFFECTS: The Proposed Action would affect the project area and would allow natural processes to continue to affect the project area. The Project would not be affected by the Project area.

ALTERNATIVE A: The Alternative A would have the same effect as the Proposed Action, but would be implemented earlier.

ALTERNATIVE B: The Alternative B would have the same effect as the Proposed Action, but would be implemented later. Additionally, Alternative B would be implemented in the SERP area.

ALTERNATIVE C: The Alternative C would have the same effect as the Proposed Action, but would be implemented in a different area.
CUMULATIVE EFFECTS: The cumulative effects of the action alternatives will be to reduce the risk of catastrophic forest fires within the project area by reducing the amount of CWD. The previous harvesting and ski area activities have provided for fuel breaks in those areas as shown on Appendix 10a.

VEGETATIVE PATTERNS

As described in Chapter Three, forested areas are somewhat naturally fragmented in the project area due to large meadows and rock areas. Additional human caused fragmentation is also occurring (i.e. ski runs, roads, trails). Further fragmentation will occur under all alternatives due to bark beetle activity and/or harvest activities. Fragmentation due to the loss of tree cover caused by bark beetle activity and/or harvest activities (except permanent roads) assumed to be temporary, effects would decrease over time as the percent canopy cover increased. Roads or other corridors into forested stands can have effects on interior forest processes. Refer to the Wildlife section for additional information. There would be no known effects on vegetation beyond those already described in other subsections (i.e. Habitat Type and Microclimate, Chapter 4-1 to 4, Sidney Valley FA).

PROPOSED ACTION

DIRECT INDIRECT EFFECTS: An estimated 3.760 acres have fallen below 20 percent canopy closure due to widespread bark beetle problem. Implementation of the Proposed Action would result in temporary losses of vegetation on the timber harvest Focus Areas since harvests would occur primarily in dead stands. A large number of additional acres are current at the time of this analysis (July, 1997) which indicates their future harvest. It is expected that canopy closure will recover to pre-outbreak levels within 50-100 years in these areas depending on the age and size of trees remaining and if any reforestation effort occurs. The proposed actions on the Springs Focus Area will contribute to fragmentation where they result non-forest, green forest areas. The constructed road would be closed, but the road base and corridor would require future management. This would fragment this section of forest by opening a permanent corridor into the interior of a previously unroaded area. The Proposed Action will accelerate the rate of reforestation and the reestablishment of mature forests by at least 10 years in the 906 acres planned for artificial reforestation. The reduction in the amount of CWD and the site preparation associated with harvesting and burning will also accelerate the rate of natural regeneration within the treatment areas.

The road regeneration treatments and the management ignited prescribed fire in the Chicken Head Focus Area would contribute to forest fragmentation, especially in areas currently fragmented by spruce beetles. It is expected that the removal of slash would recover to pre-treatment levels within 30-40 years in the open areas.

CUMULATIVE EFFECTS: Forested areas in the CFA are somewhat naturally fragmented by large meadows, especially around valleys, Peaks and Cedar Breaks National Monument. The most continuous forest cover runs north of Mathis Valley meadows to north of Hancock Peak. This area is bordered on the west by open meadows and on the east by a large expanse of a lack rock. To date this area is largely unfragmented, though roads constructed in support of harvest operations have caused some fragmentation. Past harvest activities in the area include the Blowhard, Sage Valley, Hancock Peak and Lowder Creek timber sales. The northern portion of the area is uncharacteristic to the current problem caused by spruce beetles which has created large fragmentation of the mature forest. Additional openings and roads would decrease the amount of unfragmented forest in the CFA. Highway 143 also impacts this area.

The most fragmented part of the CFA is the Deer Valley timber sale. At this time, the remaining leave strips have more edge characteristics than interior forest. This area will remain fragmented until regeneration in the clearcut strips occurs. Most of the strips have returned to the Seeding Sapling stage.

Implementation of the Proposed Action would result in more fragmentation than No Action, because of the aspen and burning treatments and road construction associated with timber harvest. Additional timber harvest proposals are likely to occur in the SRP area given the likelihood of continued spruce beetle infestations. The CUMULATIVE EFFECTS of the action alternatives should not cause an increase in fragmentation since harvest will occur on infested stands or in stands that are risk assessed and could likely be killed without additional treatments. Additional road construction to support subsequent timber harvests may contribute to fragmentation if they should traverse green, non-forest areas. Additional trail and campground development proposals and ski area expansion would continue to reduce the amount of continuous forested area. Cumulative effects on vegetation would not be measurable at this time, beyond those discussed under other subsections.

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NO ACTION ALTERNATIVE

DIRECT/INDIRECT EFFECTS: No Action would result in canopy closure falling below 20% on a similar number of acres exclusive of the aspen areas. The treatment of the Hancock Peak Focus Area would not occur which could provide information as to the effectiveness of silvicultural treatments against the risk of spruce beetle infestation. The loss of additional canopy in the Hancock Peak Area could occur which would contribute to fragmentation.

Since the spruce beetle is expected to continue infecting the mature spruce forest in the southern portion of the SRP area, silvicultural treatments of green, uninfested stands could help retain mature stands of spruce and reduce fragmentation. Under No Action, the fragmentation of the spruce forest by spruce beetles will probably continue until the food base is consumed. Recovery to pre-outbreak canopy closure levels could take 50-100 years in spruce dominated areas and 30+ years in stands with other species.

CUMULATIVE EFFECTS: No Action would result in increased fragmentation in the project area due to the loss of trees caused by bark beetles. This would be a temporary condition, though in some areas the return of a forest cover could be slow. This would contribute to fragmentation being caused by other activities in the project area. Cumulative effects on vegetation would not be measurable at this time, beyond those discussed under other subsections.

ALTERNATIVE A

DIRECT/INDIRECT EFFECTS: Implementation of Alternative A would result in the same stands falling below 20% canopy closure as described under Proposed Action except for the green stands that may sustain crown insects in the Chicken Head Focus Area. The corridor created by the road construction would also not occur. The treatment of sites 3 and 4 in location 110 would not occur which would slightly reduce fragmentation.

CUMULATIVE EFFECTS: Implementation of Alternative A would have a slightly less effect on fragmentation as described under the Proposed Action.

ALTERNATIVE B

DIRECT/INDIRECT EFFECTS: Implementation of Alternative B would result in the same stands falling below 20% canopy closure as described under Proposed Action except for the 557 acres of aspen that would not be regenerated in the Roadless Area Focus Area.

CUMULATIVE EFFECTS: Implementation of Alternative B would have a slightly less effect on fragmentation than as described under the Proposed Action.

THREATENED, ENDANGERED, PROPOSED AND SENSITIVE PLANTS

PROPOSED ACTION

DIRECT/INDIRECT EFFECTS: With the Proposed Action there would be no effects to Cedar Breaks biocorridor, Maguire campion, Navajo Lake milkvetch and Reveal penstemon. Treatment areas are not within documented occurrences or suitable habitat areas.

Because no timber harvest would occur in the riparian areas where Arizona willow occurs, there would be no direct effects. Maintaining at least a 100 foot "buffer" adjacent to and upstream from Arizona willow populations would minimize potential activities that contribute to sediment loads in streams timber harvest and associated activities such as road building and log skidding (Arizona Willow Technical Interagency Technical Team 1995, page 85).

With the harvest operations in this alternative, grasses, forbs and shrubs are anticipated to increase. This would provide more forage for elk and deer. Elk were identified as a concern for Arizona willow, particularly in Arizona. In Utah, elk populations are substantially lower, and therefore are not as great a concern (Arizona Willow Technical Interagency Technical Team 1995, page 85). Because of this, the increase in forage for elk would not be expected to influence herbaceous on Arizona willow with undeserved consequences.

CUMULATIVE EFFECTS: There would be no cumulative effects to Cedar Breaks biocorridor. Maguire campion, Navajo Lake milkvetch and Reveal penstemon from Alternative A. This is because there are no treatment areas in or near documented populations or suitable habitat for these plants.

Other past, present and future foreseeable actions include recreation use, grazing and timber sales. The Arizona willow populations, as a whole, are healthy. Past actions that have caused problems with Arizona willow have been

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and be addressed by implementing the strategy. The activities with this alternative when combined with the past, present, and future actions would not cause cumulative effects to the willow.

Because of the harvests and spruce mortality, it is increasingly important that a buffer be maintained along riparian corridors to intercept overland flow and reduce the potential for sedimentation in the streams. The harvests and spruce mortality may affect water table, which could affect the Arizona willow. With the Proposed Action, more area would be disturbed with harvests, but the watershed may refrain faster than without the harvest.

NO ACTION ALTERNATIVE

DIRECT/INDIRECT EFFECTS: Because no timber harvest would occur in the riparian areas where sensitive species occur, including Arizona willow, there would be no direct effect. There would be no need to maintain at least 100 feet "buffer" adjacent to and upstream from Arizona willow populations to minimize potential sediment loads in streams. Arizona Willow Technical Intergency Technical Team 1995, page 85).

CUMULATIVE EFFECTS: There would be no cumulative effects to Cedar Breaks Biscuitroot, Maguire campion, Navajo Lake milkvetch or Reveel pamphrash from the No Action Alternative.

Other past, present, and future foreseeable actions include recreation use, grazing and timber sales, would not be cumulative with the No Action Alternative, because there would be no effect. The Arizona willow populations, as a whole, are healthy. Past actions that have caused problems with Arizona willow have been and are being addressed by implementing the strategy. The activities with this alternative when combined with the past, present, and future actions would not cause cumulative effects to the willow.

ALTERNATIVE A

DIRECT/INDIRECT EFFECTS: Zones: Jamessa is the only sensitive plant with no suitable habitat. There are documented occurrences of Arizona willow, Cedar Breaks biscuitroot, Maguire campion, Navajo Lake milkvetch and Reveel pamphrash. There would be no cumulative effects to Cedar Brecs biscuitroot, Maguire campion, Navajo Lake milkvetch and Reveel pamphrash from Alternative A. This is because there are no treatment areas in or near documented populations of suitable habitat for these plants.

The effects of Alternative A are the same as described for the Proposed Action except there would be less acreage treated in the Lower/State area adjacent to Arizona willow populations. No treatments in the Chicken Head and Spruces Focus Areas would be no different to the willow because there are no Arizona willow populations near downstream from these Focus Areas.

CUMULATIVE EFFECTS: Because of the harvests and spruce mortality, it is increasingly important that a buffer be maintained along riparian corridors to intercept overland flow and reduce the potential for sedimentation in the streams. The harvests and spruce mortality may affect water table, which could affect the Arizona willow.

Other past, present, and future foreseeable actions include recreation use, grazing and timber sales. The Arizona willow populations, as a whole, are healthy. Past actions that have caused problems with Arizona willow have been and are being addressed by implementing the strategy. The activities with this alternative when combined with the past, present, and future actions would not cause cumulative effects to the willow.

ALTERNATIVE B

DIRECT/INDIRECT EFFECTS: There would be no cumulative effects to Cedar Breaks Biscuitroot, Maguire campion, Navajo Lake milkvetch or Reveel pamphrash from Alternative B because there are no treatment areas in or near documented populations of suitable habitat for these plants.

With Alternative B, the effects to Arizona willow would be the same as described in the Proposed Action except there would be no burning in the Roadless area. This area is adjacent to and upstream from an Arizona willow population.

Zones: Jamessa is the only sensitive plant with no suitable habitat. There are documented occurrences of Arizona willow, Cedar Breaks Biscuitroot, Maguire campion, Navajo Lake milkvetch and Reveel pamphrash.

Because no timber harvest would occur in the riparian areas where Arizona willow occurs, there would be no direct effect. Maintaining at least a 100 foot "buffer" adjacent to and upstream from Arizona willow populations would minimize potential activities that contribute to sediment loads in streams (timber harvest and associated activities such as road building and log skidding) (Arizona Willow Technical Intergency Technical Team 1995, page 85).

With the timber harvest in this alternative, grasses, forbs and shrubs are anticipated to increase. This would provide more forage for elk and deer. Elk were identified as a concern for Arizona willow, particularly in Arizona. In Utah, elk populations are substantially lower, and therefore are not as great a concern (Arizona Willow Technical Intergency Technical Team 1995, page 85). Because of this, the increase in forage for elk would not be expected to influence herbivory on Arizona willow with undesired consequences.

CUMULATIVE EFFECTS: There would be no cumulative effects to Cedar Breaks biscuitroot. Maguire campion. Navajo Lake milkvetch or Reveel pamphrash from Alternative A. This is because there are no treatment areas in or near documented populations of suitable habitat for these plants.

Other past, present, and future foreseeable actions include recreation use, grazing, and timber sales. The Arizona willow populations, as a whole, are healthy. Past actions that have caused problems with Arizona willow have been and are being addressed by implementing the strategy. The activities with this alternative when combined with the past, present, and future actions would not cause cumulative effects to the willow.

Because of the harvests and spruce mortality, it is increasingly important that a buffer be maintained along riparian corridors to intercept overland flow and reduce the potential for sedimentation in the streams. The harvests and spruce mortality may affect water table, which could affect the Arizona willow. With the Proposed Action, more area would be disturbed with harvests, but the watershed may refrain faster than without the harvest.

RECREATION RESOURCES

The following issues were among those identified by the I.D. Team that drove the alternative development. This section describes the effects to these issues.

Issue One: Proposed activities will reduce the existing motorized recreation opportunities, or conversely to reduce existing non-motorized recreation opportunities that offer solitude, free from interaction with motorized vehicles.

Issue Two: Proposed activities will reduce scenic quality, recreation quality and opportunities, air quality, public safety, and recreational quality, and may reduce visitation and associated income to recreation service businesses.

Issue Three: Concern that proposed activities will alter the undeveloped character of the Hancock Peak and Spruces Roadless Inventory areas, including impacting opportunities for semi-primitive non-motorized recreation experiences.

The spruce beetle epidemic is changing the scenic environment of the analysis area. As the tall spruce that are integral to the current landscape character of the analysis area continue to die, it changes the scenic resources. At present, most of the mature spruce on the northern part of the analysis area are dying or at extreme risk of attack by the bark beetle. As the epidemic continues, dead spruce trees will begin to dominate the view in many areas. A complete discussion on the range of potential alterations to scenic quality is included in the "Effects of Spruce Beetle Epidemics and Silvicultural Treatments on Scenic and Recreation Resources" in available for review (Project File, exhibit 20). Visitation to the analysis area has continued to increase since 1991, as measured through traffic counters and campground receipts (see Project File, exhibit 20 for complete records). To date, the beetle epidemic and associated management activities have not appeared to cause a decline in recreational visitation to the area. In other areas impacted by widespread bark beetle epidemics there was a reduction in recreation use observed (see discussion in "Effects of Spruce Beetle Epidemics and Silvicultural Treatments on Scenic and Recreation Resources" on pages 24-25).

Recreation can be affected by factors associated with both the Proposed Action and No Action alternatives. Scenic quality is a critical element for attracting current recreation use for all activities. Alteration of scenic quality may result in reduction of the quality of recreation visits and may lead to the displacement of recreation visitors away from the area. Activities associated with the Proposed Action could also have direct or indirect effects on short term
or permanent displacement of recreation visitors. Direct effects would be temporary closure of roads or trails due to disturbance of wildlife. Indirect effects would be displacement occurring because of noise, dust, slash and smoke and other related effects in the vicinity of recreation sites. Another indirect effect that could lead to short-term reduction in visitation is publicity through local and regional media about analysis area issues and actions.

**PROPOSED ACTION**

**DIRECT/INDIRECT EFFECTS.** The Proposed Action was designed to avoid or limit interference with high use recreation areas while allowing salvage of beetle killed spruce and prescribed burning of beetle killed areas and Aspen clones in need of regeneration. However, there is some recreation use in the Proposed Action Focus Areas and the Focus Areas are sometimes visible as foreground and middleground, Highways 143 and 148 and area trails. Therefore, it is likely that there will be a reduction in recreation use and the quality of visitors’ experience in project Focus Areas. This may be long term displacement following treatment activities where spruce visually dominate an area and mortality and subsequent removal has been high. Smoke from prescribed fire treatments may impact use and recreation experiences, depending on weather conditions at the time of the prescribed fire treatments. It is expected that interpretation, explaining the action taken, that impacts to recreation use can be reduced.

**Highway 143**

Minor direct effects are expected from Proposed Action regarding use of Highway 143 for purposes of driving for pleasure and viewing scenery. It is not anticipated that there will be any road closures, or delays in traffic, but increased traffic flow with logging vehicles and equipment is anticipated. Smoke can cause reduced visibility during prescribed burning of area treatment areas, which are on the northern east edge of the Hancock Peak Focus Area, and the southwestern edge of the Lower State Focus Area.

There will be immediate foreground views of the Hancock Peak Focus Area from Highway 143. Other stands in the Hancock Peak and Lower State Focus Areas are visible from Highway 143 and 148 as foreground and middleground. The immediate foreground views of the harvest and prescribed fire activities may result in a reduction in recreational use by some visitors. The prescribed fire open season proposal for sites 3 and 4 in location 110 on the Lower State Focus Area are most likely to alter the scenic quality of Highway 143, if the Hancock Peak demonstration area is successful. These two areas within 1/2 mile of the site 110 stand, and are important to the scenic Rainbow Meadows Area as seen from Highway 143. These stands found approximately 1 mile of the foreground of Highway 143. This is not expected to result in decreased use of the Rainbow Meadows Area by visitors to Rainbow Meadows Area. The Rainbow Meadows Area contains treated stands that were within the immediate foreground views of Highway 143. The traffic corridor operated by the Park Service at the eastern boundary of the National Monument showed an increase in use of each of the past five summers (see data and comments available in the Project File, exhibit 20). It is expected that this corridor, located on the western boundary of the Rainbow Meadows project, would have recorded a reduction in use during the salvage sale of harvest activities had been a major impact.

The Hancock Peak Focus Area is a demonstration area, to test a variety of treatment alternatives for their effectiveness in deterring insect attack. If the treatments are successful, a residual forest stand will be maintained in this area. This slope is visually dominant in the Rainbow Meadows area. Maintaining a live spruce forest will help preserve the existing scenic quality, increasing the quality of the experience traveling Highway 143.

**Additional Roads Within The Project Area**

The roads most impacted were roads constructed for the former Hancock Peak, Lower State Deer Creek and Bunker Creek Timber Sales. These roads will function as collector roads for the harvest areas, there would be encountered encounters with logging equipment, trucks, skidders and loading equipment. There would be expected delays to motorists traffic on these roads. These areas may also be closed to vehicles not associated with harvest or prescribed fire when these activities are occurring. The Sidney Valley Road would be used to transport logs from the Spruces, Bunker Creek, and Lower State focus areas. Logs from summit forest area would be removed through a route being constructed across private land owned by Brian Head Ski Resort, and transported via Highway 143.

Roads associated with the Hancock Peak Focus Area are scheduled to be closed following this action as described in the Hancock Peak EA. This will reduce some of the current motorized recreation opportunities in this area.

Red Desert Road (#015) is groomed as snowmobile trail for snowmobiles in the winter (see map in the Project File, exhibit 20). A proposed snowmobile route crosses through the Lower State Focus Area. Winter harvest activities may disrupt snowmobile use. This action would include reconstructing and improving several area roads. The road that provides connection into the Spruces Focus Area would be gated upon completion of the harvest activities, and non-motorized use (hiking, mountain biking, and horseback riding) would be permitted following the road closure.

Focus Areas are visible as immediate foreground and foreground views from area roads. While harvest activities are occurring, visitors who are sensitive to these activities may have a reduced quality experience and may be displaced to other areas.

**Camping**

There is dispersed camping that takes place adjacent to some of these roads. Some displacement of dispersed camping may occur. There would not change plans as a result of the proposed Action. If there is long term displacement following treatment activities where spruce visually dominate an area and mortality and subsequent removal has been high. Smoke from prescribed fire treatments may impact use and recreation experiences, depending on weather conditions at the time of the prescribed fire treatments. It is expected that interpretation, explaining the action taken, that impacts to recreation use can be reduced.

**Hunting And Fishing**

Direct effects include temporary closure of areas while harvest and prescribed fire activities are occurring. Indirect effects of the salvage harvest and prescribed fire of the Proposed Action on hunting may occur if harvest activities result in a depletion of wildlife populations. These effects are both expected to be short term, limited to the period of active harvest activities.

Where spruce dominate an area and there is high spruce mortality and subsequent removal, security/hunting cover for deer and elk would decrease. Bow hunting may increase as farms and furres are reestablished where spruce once dominated. Big game hunting would likely continue at existing levels; although hunting patterns may change as changes to hunting cover and browse occur. Where aspen treatments are proposed, big game browsing and hiding cover are expected to increase.

Changes in vegetation structure from harvest and spruce beetle mortality may change hunting use patterns. This may be due in part to changes in cover for hunters, as well as changes in big game use patterns (see Wildlife Section).

Temporary closures may impact fishing Mammoth Creek where it crosses through the Hancock Peak Focus Area, and the Lower State Focus Area. This area crosses Rainbow Meadows Area. Treatment activities have been designed to reduce impacts upon the lake to those areas. Lower Pond is outside of the Lower State Focus Area. Bunker Creek would not be impacted by the Bunker Creek Focus Area. Fishing access would therefore not be impacted in those areas. Where individual areas are sensitive to the harvest and prescribed fire activities, or changes that occur to views as a result of these activities, temporary or permanent displacement may occur among these individuals.

**Brian Head Town And Vacation Home Sites**

The economy of Brian Head Town is dependent on recreation visitors. Most of the businesses provide services to recreational visitors. There are no direct impacts anticipated to the recreation activity. There may be impacts to summer recreation visitation, but it is difficult to predict. As detailed in the Highway 143 discussion, it is not expected that there will be much reduction in numbers of visitors driving for pleasure or viewing scenic areas, and some reduction in visitation by those planning to hike or mountain bike within or near the Focus Areas for the duration of harvest activities and clean up. None of the stands proposed for treatment in the Proposed Action are within immediate views from homes or businesses in the Brian Head Town or the Lower State Focus Area. Evidence of harvest activities in the Steam Engine Focus Area and prescribed burning activities in the Chicken Hawk Focus Area may be visible as middle ground from parts of Brian Head Town and nearby residences. People who are living in the area are expected to be more sensitive to changes as a result of the Proposed Action than visitors who
spend less time in the analysis area. This may alter or reduce the experience of the area for some community members and homeowners.

There may be smoke present in Brian Head Town and the surrounding area during prescribed fire treatments. Communication between the community and Forest Service representatives will be critical when these treatments are occurring to reduce concern among residents and visitors.

Trails Use

The trail most impacted by the Proposed Action is the Spruces Trail that crosses through the Spruces Focus Area. This trail would be closed during spruce salvage and prescribed fire activities. Following completion of the harvest and prescribed fire activities, the proposed access road would be incorporated into the Spruces trail system. There has been heavy mortality observed in the spruce stands that approximately two miles of this trail passes through. Upon completion of the proposed salvage and prescribed fire, the area would be changed from a dense forest cover to a much more open area with 1/2 to 2 acre clumps of mostly dead tree cover remaining. For those visitors who are sensitive to harvest and prescribed fire activities or the changes that occur to views as a result of these activities, temporary or permanent displacement may occur.

The Hancock Peak trail will be impacted by both the Roadless Focus Area and Hancock Peak Focus Area proposed treatments. Temporary closures are anticipated during the prescribed fire treatments proposed for the Roadless Focus Area. A trail working crew will be on the trail crosses through the Hancock Peak Focus Area. In part of this area, high spruce mortality has been observed, and salvage created openings are expected to occur along both sides of the trail. Approximately three miles of trail may be temporarily closed by the prescribed fire treatments being proposed for this area. Evidence of fire may dominate the views through this area. For those visitors who are sensitive to harvest and prescribed fire activities or the changes that occur to views as a result of these activities, temporary or permanent displacement may occur.

The Dark Hollow trail will also be impacted by the Proposed Action. Approximately 1/2 mile of the Dark Hollow trail crosses private land that is owned by Brian Head Ski Resort. The Resort has reported plans to harvest the beetle killed spruces on this property, and requested that the trail be rerouted to Forest Service system lands. This is a part of a project of the Proposed Action. A non-treatment area of minimum three hundred feet will be left adjacent to the rerouted Dark Hollow trail, so that a temporary closure will not be necessary as a result of the salvage treatment. At designated points, some skidding may occur across the trail to allow access to areas above the trail. This could cause temporary disruption of trail use. The Dark Hollow trail may have to be temporarily closed for a few days during prescribed fire treatments in the Chicken Head Focus Area. This closure will not impact the Hemlock-Lake Trail. As a result of leaving a non treatment area adjacent to the trail, there is expected to be some risk of a prescribed fire reaching the trail.

The first 1/2 mile of the Left Hand Fork of Bunker Creek will be rerouted so as avoid conflict with logging trucks and equipment on the access road to the Bunker Creek Focus Area. The Right Hand Fork of Bunker Creek is not associated with any Focus Areas. There are no closures anticipated for either fork. All salvage activities are located along the edge above the Bunker Creek trail.

Other trails within the analysis area would not be directly impacted by the Proposed Action. For any trails in the spruce zone, those visitors who are sensitive to harvest and prescribed fire activities, or the changes that occur to views as a result of these activities, temporary or permanent displacement may occur. Also visitors who are sensitive to the presence of the appearance of a dead and dying forest may also be temporarily or permanently displaced.

Brian Head Peak

There will be evidence of harvest activities from the overlook on Brian Head Peak (see Chapter Four - Scenic Recreation). The Proposed Action will not directly impact use of the peak as an overlook. There may be a reduction in the quality of the experience for visitors who are sensitive to harvest activities. This is not expected to reduce the use of the Peak as an overlook.

This Focus Area contains approximately 700 acres in Management Area 1 and 480 acres in Management Area 6A (livestock grazing). The management emphasis for 6A is to manage for livestock grazing and promote qualities that enhance this use. The current recreation management in both MA 1 and 6A is consistent with semi-primitive recreation use dominated throughout most of the Focus Area. Where there are roads, the use is consistent with semi-primitive recreation use. Currently there are no additional motorized recreation use and the exploration zone of the Focus Area is an area of extreme recreation use. Current recreation management emphasizes a reduction in the quality of the experience for visitors who are sensitive to harvest activities. This is not expected to reduce the use of the Peak as an overlook.
Roadless Area Focus Area: The 2,792 acres of this Focus Area are primarily located in Management Area 2A. This Focus Area is named after the unmanaged character of this Hancock Focus Area. However, it may reduce the opportunity for solitude by increasing the site distances. There are currently few places along the Hancock Peak Trail where visitors can see the immediate front range less than 300'.

The Proposed Action is not expected to change the R0S classification as defined in the Forest Plan of any units within the focus area. The recreation created by prescribed fire may decrease the sense of solitude for some visitors by increasing the potential for encounters with others. This is due to the longer site distances once prescribed fire has taken place. This may reduce the quality of the experience for some visitors, particularly trail users. Prescribed fire is often interpreted as a natural change in the landscape by the uninformed visitor (Tate and Daniel 1983).

Dirt Creek Focus Area: The Dirt Creek Focus Area contains 772 acres of which up to 534 acres are proposed for aspen regeneration prescribed fire and is entirely within Management Area 1. Seven primitive four wheel drive road areas are in this Focus Area. The current use is consistent with semi-primitive motorized recreation. The Proposed Action would not change the character from semi-primitive motorized recreation. Openings created by the proposed treatments may decrease the sense of solitude for some visitors by increasing the potential for encounters with others. This is due to the longer distance once prescribed fire has taken place. In areas where prescribed fire is the regeneration method used, it is often interpreted as a natural change in the landscape by the uninformed visitor (Tate and Daniel 1983). This focus area would not change current management however following the prescribed burns there may be more access for motorized vehicles where openings are created in vegetation structure.

CUMULATIVE EFFECTS: There are several sanitation-salvage harvests that are taking place or being considered in the Bunter Creek, Rainbow Meadows, Sydney Valley, Parquiag Lake, and Blues Springs-DeLong Flat valleys, and Mudshale Face projects are all within the west-sheds of Highlands 143, 14, and 148. Visitors will likely have multiple encounters with harvesting and post harvest activities while visiting the area. There was no reduction in use of recreation areas around Parquiag Lake during salvage harvests in that area and no change in the proposed action. This may be a measurable reduction in use where participants are immersed in the environment, such as hiking, mountain biking, or camping (Brooks et al. 2013). This may reduce the quality of experience for some visitors, particularly trail users. There may be displacement of visitors sensitive to harvest activities, the appearance, of vegetation management, and the appearance of beetle killed-spruce, but there is not expected to result in a measurable decrease in use.

Trails with frequent mountain bike use cross through several past, current, and proposed timber harvest areas. Using data obtained from a recent survey, Bunker Creek trail receives the most use from mountain bike users and passes through the Sydney Valley project area, where salvage harvest of beech killed spruce is ongoing. The trail terminates in the Parquiag Lake project area, which ended in 1994. The Lower State Focus Area includes sections of this trail. The Dark Hollow trail is the second most requested destination for mountain bike users. Like Bunker Creek, the slopes originate within the Bunker Head Project area. The recently constructed connection from Bunker Head Recreation Area, through Bald Mountain Trail passed through standing trees treated under the Bunker Head Project. Other trail passes through the Hancock Peak and DeLong Flat areas, completed in 1987 and 1980. Other projects affecting trails include Blue Springs-DeLong Flat valleys. It is likely that mountain bikers will have multiple encounters with harvesting and post harvest activities while in the CEA. For visitors who are sensitive to harvest activities there may be a reduction in the quality of the experience. For these individuals, there may be temporary or permanent displacement. It is difficult to predict what effect this will have on the total number of mountain bike trail users.

NO CONFO\ness

1) LITERATURE REVIEW

Tress killed by the spruce beetle will begin to fade and lose needles within the next two years. Beetle associated mortality is expected to continue at current or accelerated levels through the year 2010. The effects to scenic quality from spruce mortality should subside by the year 2010. The effects to recreation use is closely tied to the presence of this change in the landscape (Tate and Daniel 1983). The Openings created by prescribed fire may decrease the sense of solitude for some visitors. The Proposed Action would not change the character from semi-primitive motorized recreation.

The Spruces Focus Area would preserve the unmanaged character of this area, and would eliminate the need for short term disruption to use of the Spruces Trail. Where the trail crosses through spruce stands with high spruce mortality, these stands will be increased maintenance problem. It is estimated that approximately 10% of the beetle killed spruce will blow down in this area over the next twenty years, barring a major wind event. After twenty years of beetle activity, this forest would be dominated by aspen, lodgepole pine, and Engelmann spruce. This may lead to the eventual closure or relocation of this trail.

Removing the Spruces Focus Area would reduce the impact of smoke to Brian Head Town and Resort area. Also this reduces the potential impacts to scenic quality from Brian Head Town and Yankee Meadows to the appearance of fire altered landscapes. However, the changes created by spruce mortality would continue. (Effects of Prescribed Fire on Scenic and Recreation Resources').

Removing the Spruces Focus Area would preserve the unmanaged character of this area, and would eliminate the need for short term disruption to use of the Spruces Trail. Where the trail crosses through spruce stands with high spruce mortality, these stands will be increased maintenance problem. It is estimated that approximately 10% of the beetle killed spruce will blow down in this area over the next twenty years, barring a major wind event. After twenty years of beetle activity, this forest would be dominated by aspen, lodgepole pine, and Engelmann spruce. This may lead to the eventual closure or relocation of this trail.

Removing aspen regeneration prescribed burn units 3 and 4 from the Lower State Focus Area would reduce scenic impacts to the foreground of Highway 143 and the Hancock Peak and Rainbow Meadows subdivisions. These units are approximately 30 mile long and forms the northern edge of Rainbow Meadows. These stands are an important element in defining the current scenic character of Rainbow Meadows.

There will be a likely a reduction in recreation use and the quality of visitors' experience in Alternative A Focus Areas during harvest and prescribed fire activities and the following clean-up period. It is difficult to predict how much additional by use will occur, because there are not adequate data to determine the exact level of visitors to harvest activities. Using visual preference as an indicator, displacement occurring because of visual quality would be short term (less than five years). Preference ratings in studies by Benson (1987) and Schendel (1983) and others to the north in areas where the sky, slopes, and stands were evident and prior to the recovery of forest floor ground cover (McCool and Benson, 1989). It is estimated that visitors could encounter these visual conditions for at least five years, including anticipated follow-up treatment. Local and regional use would be the most likely to be displaced during this period, because of more frequent visits and exposure to local publicity.
Visitors from outside the region will be less likely to be displaced because of harvest and prescribed fire activities. Most visit the area infrequently, and probably would not change plans as a result of proposed treatments. There may be long-term displacement following treatment activities where space-use patterns remain constant. Smoke from prescribed fire treatments may impact use and recreation experiences, dependent on wind and atmospheric conditions at the time of the prescribed fire treatments. It is expected that with interpretation explaining the actions taken, that impacts to recreation use can be reduced.

**Highway 143**

Minor direct effects are expected from Alternative A regarding use of Highway 143 for purposes of driving for pleasure and viewing scenery. It is not anticipated that there will be any road closures, or delays in traffic, but increased traffic flow associated with logging vehicles and equipment is anticipated. There may be some reduced visibility during the burning of the aspen treatment areas, which are on the northern edge of the Hancock Peak Focus Area.

There will be immediate foreground views of the Hancock Peak Focus Area from Highway 143. Other stands in the Hancock Peak and Lower/State Focus Areas are visible from Highways 14 and 143 as foreground and middle-ground views of immediate foreground views and of the effects of harvest and prescribed fire activities may result in a reduced quality of experience for some visitors, but is not expected to result in a measurable reduction in use of Highway 143.

**Brian Head Town and Vacation Home Sites**

The exposure to proposed activities is dependent on recreation visitors. Most of the businesses provide services to recreation visitors. There are no expected direct impacts to winter recreation visitors. There may be impacts to summer recreation visitation but it is difficult to predict. As detailed in the Highway 143 discussion, it is not expected that there will be any reduction in numbers of visitors during the period of use or viewing. There may be some reduction in visitation by those planning to hike or mountain bike within or near the Focus Areas for the duration of harvest activities and clean-up.

Alternative A will reduce the impacts to recreation usage compared with the Proposed Action. The Spruces Trail which is promoted as a mountain bike route by Brian Head Town. would not be impacted by the Proposed Action. With Alternative A/Blow-down is eventually within 20 years expected to become a problem, impact use and maintenance of the trail. Visitations to Brian Head Town can be impacted by changes to the landscape within the GIA over Recreation Cumulative Effects Map Appendix 1A.

**Trail Use**

The Dark Hollow trail will also be impacted by the Alternative A. Currently approximately 1/2 mile of the Dark Hollow trail crosses private land that is owned by Brian Head Ski Resort. The Resort has reported plans to harvest the harvestable stands on the private property and requested that the trail be rerouted to Forest Service lands. This re-route is part of the Alternative A. A non- treated area of a minimum of three hundred feet will be left adjacent to the proposed Dark Hollow trail so that a temporary closure will not be necessary as a result of harvest.

As a result of learning a non-adjacent area to the trail, there is expected to be some block of blow down from the burned areas. It is anticipated that approximately 16 percent of these trees would blow down during the next 20 years. This would include the remaining stands and Hinds, 1974. Hinds, Hankworth and Davidson, 1965 and Michalek, 1968. After 20 years the blow down is expected to accelerate rapidly and the trail may need to be relocated or closed where it crosses through stands with high stroke mortality. Alternative A would not impact the Dark Hollow Trail on the north of the south boundary Focus Area.

**Recreation Opportunity Spectrum**

The Forest Plan specifies that Management areas 1A, 1B, 2A and 2B should be managed primarily for recreation, and the qualities that enhance this. Use Management areas 1A recreation sites and 1B (winter sports sites) occur within area 1A. Management areas 2A and 2B recreation areas and 2B/medium natural recreation occur in Hancock Peak and Lower State Focus Areas. The Forest Plan does not give specific recreation direction to Management Area 1. These areas can be managed across the ROS range.

**Lower/State Focus Area**

This Focus Area contains 642 acres in Management Area 1 (general direction). 219 acres in Management Area 2A (two/semi-primitive recreation) and 126 acres in Management Area 2B (2B natural recreation). The aspen regeneration prescribed burns, units 1 and 4 are the only parts of this Focus Area located in the 2B Management Area.

**Spruce Ecosystem Recovery Project**

Area and are excluded from this alternative. As a result of the roads constructed for the logging in this area, the current management of the 2A area is consistent with semi-primitive motorized recreation. The current management of the MA 1 is also consistent with semi-primitive motorized recreation.

**CUMULATIVE EFFECTS:**

There are several sanitation/salvage harvests that are taking place or being considered within the cumulative effects areas for recreation. Brian Head, Rainbow Meadows, Sidney Valley, Panquatch Lake, Blue Spruce/Reeds Valley and Midway Face projects are all within the viewsheds of Highways 143, 14, and 148. It is expected that the Alternative A will not cause a measurable decrease in travel along Highways 143, 14, and 148 visits to developed recreation sites. There may be a reduction in the quality of the experience for recreation visitors. There may be displacement of visitors sensitive to harvest activities, the appearance of vegetation management, or the appearance of beetle killed spruce, but there is not expected to result in a measurable decrease in use.

**Trails with frequent mountain bike use through several past, current and proposed timber harvest areas.** Other proposed projects effecting trails include Blue Spruce/Reeds Valley. It is likely that mountain bikers will have multiple encounters with harvesting and post harvest activities while in the Cumulative Effects Area. For visitors who are sensitive to harvest activities there may be a reduction in the quality of the experience. For these individuals there may be temporary or permanent displacement. It is difficult to predict what effect this will have on the total number of mountain bike trail users.

**ALTERNATIVE B**

**DIRECT/INDIRECT EFFECTS:** The Alternative B removes the Roadless Focus Area from the Proposed Action. This changes the unmanaged natural landscape in the Hancock Peak area. This change has the opportunity to further develop and create a special opportunity to recreate the opportunity for solitude and a sense of remoteness from the sights and sounds of other humans. This alternative would also reduce the impacts of smoke to Cedar Breaks National Monument and Brian Head Town.

For a complete description of this alternative, see the Recreation Resources Specialist Report in the Project File, exhibit 20.

With the exception of the Roadless Focus Area, this alternative is identical to the Proposed Action. There will likely be a reduction in recreation use and the quality of visitors' experience in project Focus Areas during harvest and prescribed fire activities and the following clean-up period. It is difficult to predict how much reduction may occur. Because there are many variables that are not known. It is not known the sensitivity level of visitors to harvest activities. Local and regional use would be the most likely to be displaced during this period. Because of more limited trails and daytime use, experience with local publicity. Visitors from outside the region would be less likely to be displaced because of harvest and prescribed fire activities. Most visit the area infrequently, and probably would not change plans as a result of proposed treatments. There may be long term displacement following treatment activities where space-use patternly dominate an area and mortality and subsequent removal has been high. Smoke from prescribed fire treatments may impact use and recreation experiences, dependent on wind and atmospheric conditions at the time of the prescribed fire activities. It is expected that with interpretation explaining the actions taken, that impacts to recreation use can be reduced.

**Trail Use**

The trail most impacted by the Alternative B is the Spruces Trail that crosses through the Spruces Focus Area. This trail would lose its forest service salvage and prescribed fire activities. Following completion of the harvest and prescribed fire activities, the proposed access road would be incorporated into the Spruces trail system. There has been heavy mortality observed in the spruce stands that approximately two miles of this trail passes through. Upon completion of the proposed salvage and prescribed fire, the area will be changed from a forest Becker cover to a much more open area with 1/2 to 2 acre clumps of tree cover remaining. Much of the mature spruce remaining in the clumps expected to die. For those visitors who are sensitive to harvest and prescribed fire activities or the changes that occur to views as a result of these activities, temporary or permanent displacement may occur.

The Hancock Peak trail will be impacted by the Hancock Peak Focus Area proposed treatments, but the impacts associated with the Proposed Action in the Hancock Peak Roadless area would not occur under this alternative. Temporary or permanent displacement are anticipated during the salvage harvest activities. Approximately 3/4 - 1 mile of the trail crosses through the Hancock Peak Focus Area. In part of this area, high mortality has been observed, and salvage created openings are expected to occur along both sides of the trail. For those visitors who are sensitive to harvest activities or the changes that occur to views as a result of these activities, temporary or permanent displacement may occur.
**SCENIC RESOURCES**

The following issues were among those identified by the IDA Team that drove the alternative development. This section describes the effects to these issues.

**Issue Two: Proposed activities will reduce scenic quality, air quality, public safety, and recreational activities, and may lead to a violation of state and federal scenic quality and recreation service standards.**

**Issue Three: Concern that proposed activities will alter the undeveloped character of the Spruces and Hancock Peak Roadless areas.**

The visual quality of the Spruce Ecosystem Recovery Project analysis area is important to the many people who live in this area and visit this area for its unique scenic qualities. Highways 148, 148A and 148B are popular routes for visitors to reach the Spruces and Hancock Peak Roadless areas. Because of the high concentration of visitors to the project area, the visual resources of this area are critical to the experience and perceptions of visitors.

A detailed literature review is contained in the "Effects of Spruce Beetle Epidemics and Industrial Activities on Scenic and Recreation Resources" (Brunswick 1997a), and "Effects of Fire on Scenic and Recreation Resources" (Brunswick 1997b). Data from the Cedar City Ranger District, Dixie National Forest, and many other researchers have been compiled by a comprehensive discussion on the effects spruce beetle killed forests have on scenic resources, and the impacts of associated activities, including timber harvest and prescribed fire. These papers also contain literature reviews concerning the nature of public responses to different harvest techniques, volume of removal and viewing distance. Information from this literature review has been used to project visitor responses to proposed activities in the SERP Focus Areas. Projections on anticipated changes in use are included in Chapter Four: Recreation Resources section.
Visual Impacts of Prescribed Fire

Prescribed fire causes short-term and long-term visual impacts, and may begin to dominate the view as the size of the area burned increases. When prescribed fire is used in a forest, the most obvious areas of burned pines evident. Due to these pines having been scattered may be some short term evidence of darkened litter and soil that will soil that will later become visible. The immediate ground and generally not noticeable within the immediate - ground. Greater visible - impacts will occur or areas where prescribed fire is used to regenerate aspen or redwood in areas of high shrump-morta, areas. This includes charred bark of standing trees and down logs, and a blackened appearance to the charred, burned, and standing dead. The visual impacts will be reduced within 1-2 years with the regeneration of ground cover plants and the deposition of forest litter over the burned sites. Charred bark, limbs, and other features may be visible for many years.

Regeneration is expected to take place in aspen stands within one year, shoots growing two to three feet within the first year. Fire Comm. Brian Ferguson, Dixie National Forest Silverthorne, 1997. Treated aspen clones have a shrub appearance for fifteen to twenty years following the fire. Because aspen grows relatively quickly, within ten to twenty years the stands begin to develop a high canopy. When a visible aspen clone exists in a spruce-fir community, aspen will be the first trees to return to the area following a disturbance.

Spruce for forests take longer than aspen to regenerate. An understory of grasses, forbs and shrubs will be visible within a year. In light shade or full sun, trees grow to four or five feet in about 20 years (Eisenthal 1997). For the next 20 years, openings made areas following the prescribed fire will have the appearance of a young forest. Many trees will be seeding to sapling age classes.

Fire effects are as a natural phenomenon by most visitors, expressed by strong support for prescribed natural fire policies. While fire was considered to have diminished scenic values, the presence of fire did not adversely affect scenic values (Frisco and Watson 1992). Light prescribed fires are preceded to enhance scenic quality for up to five years. Severe fires were judged to cause deterioration in scenic quality and recreational acceptability for a prolonged time (Taylor and Daniel 1998).

Additional information and photos are contained in Brunswik 1997a, Project File. Exhibit 19.

PROPOSED ACTION

DIRECT INDIRECT EFFECTS

Hancock Peak Focus Area

The direct and indirect effects of the Proposed Action to the scenic resource are dependent on the success of the demonstration project. If the demonstration harvest succeeds in reducing spruce mortality, the forest of an area of foreground to middleground view will be maintained at or near the current level in area subdivisions and High for the Hancock Peak Focus Area, the spruce stands will be open, reducing the visual dominance of the increasing site distances. The remaining individual trees will be more evenly spaced than a natural growing pattern, which tends to be clumps. There will be increased evidence of stumps. In the short term there will be increased slash and ground disturbance in the immediate foreground. The target live basal area is 100 square feet per acre (Brunswik 1997a, page 141). Stumps, slash and ground disturbance will be visible within the mile of the eastern slopes of the Hancock Peak Trail, but will not dominate the view. Slash will be reduced along the trail to within one year. The casual observer would probably recognize little change. Viewers that are very familiar with the existing view, such as homeowners in area subdivisions, are likely to notice a "dimmed" appearance. The Scenic Integrity Level would be Moderate to High from Hancock 143 if the demonstration project is successful in reducing spruce mortality and maintaining a forested appearance.

If the demonstration harvest is not successful in reducing spruce mortality, the stands within the Focus Area will be salvage harvested to below 55 square feet live basal area. If this occurs, openings will be visible from Highway 143 and area subdivisions. Stumps, slash and ground disturbance may dominate the view in the immediate foreground and the Hancock Peak Trail. To meet wildlife and watershed needs, and maintain a forest like structure, clumps of standing dead will be left unharvested, clumps of standing dead 1/8 to several acres in size. This will help to reduce the visual dominance of the openings. Openings, and provide a remnant forest structure from the Spruce in the immediate foreground and forest views. The sense of enclosure will be reduced when traveling along this trail. Stumps, slash and ground disturbance will dominate the view in the immediate foreground. To meet wildlife and watershed needs, and maintain a forest like structure, clumps of standing dead 1/8 to several acres in size will be left unharvested. This will provide full color, and potential wildlife watching opportunities. These units will contribute to reducing the Scenic Integrity Level to low or very low for 10 to 20 years, when accounting for impacts from nearby spruce removal and mortality.

Spruce Focus Area

The Spruce Focus Area is high in this Focus Area. Many spruce stands within the Focus Area will be salvage harvested to below 55 square feet live basal area. Openings will be visible from Highway 143 and area subdivisions. Stumps, slash and ground disturbance may dominate the view in the immediate foreground and forest views. This sense of enclosure will be reduced when traveling along this trail. Stumps, slash and ground disturbance will dominate the view in the immediate foreground. To meet wildlife and watershed needs, and maintain a forest like structure, clumps of standing dead 1/8 to several acres in size will be left unharvested. This will provide full color, and potential wildlife watching opportunities. These units will contribute to reducing the Scenic Integrity Level to low or very low for 10 to 20 years, when accounting for impacts from nearby spruce removal and mortality.

The Scenic Integrity Objective for this area is High in the foreground of Highway 143. If high volume salvage takes place, it will take 40-50 or more years to achieve a High Scenic Integrity in this viewshed. At 40 years, seedlings will have reached 4-6 feet in height. After 80 years, the spruce stands will become established in the immediate foreground. The Scenic Integrity could be achieved once ground cover has been reestablished in the salvage areas, approximately five years.

Apen regeneration treatments are proposed in small, isolated aspen clones in the north eastern Focus Area. These would be visible from Highway 143, but would not be visible from area subdivisions. They are not expected to dominate the view or change the Scenic Integrity Level of the area. The aspen clone would have a "shrubby" appearance for approximately 20 years. They would still provide fall color, and potential wildlife watching opportunities.

Lower/State Focus Area

Spruce mortality is high in this Focus Area. Many spruce stands within the Focus Area will be salvage harvested to below 55 square feet live basal area. Openings will be visible from the Sidney Valley Road (30340), and may be visible from Highway 143 in foreground and middleground views. Views are restricted because of topography and vegetation along the Sidney Valley Road through this Focus Area. Salvage will likely lengthen views where spruce is the controlling vegetation. Stumps, slash and ground disturbance may dominate the view in the immediate foreground of the Concern Level 3 roads within the Focus Area. The Lower Ponds trail passes near this Focus Area. Openings may be visible from this trail. To meet wildlife and watershed needs, and maintain a forest type structure, clumps of standing dead 1/8 to several acres in size, will be left unharvested. This will help to reduce the visual dominance of the openings, and provide a remnant forest structure until seedlings are established. Most views will provide a diminished scenic quality until seedlings are established. Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the salvage areas, approximately five years.
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will help to reduce the visual dominance of the openings, and provide a remnant forest structure until seedlings are established. Most viewers will perceive a diminished scenic quality in this Focus Area. This area currently has the appearance natural evolving landscape. Within the foreground of the trail there is no evidence of roads or past management activities. This Proposed Action will change the undeveloped character of this Focus Area. The proposed road will be evident following completion of the harvest. A decrease in the sense of solitude and privacy and scenic quality will likely occur while traveling the Spruce trail a short distance.

The Scenic Integrity Level will be reduced. The level of reduction will be dependent on live tree cover remaining in a viewshed. If substantial tree cover remains from aspen or remnant spruce, the Scenic Integrity Level will be high to moderate. If openings begin to dominate the view, the Scenic Integrity Level may be reduced to Low or Very Low. The Scenic Integrity Objective for this area is High in the foreground of the Spruces Trail. If high volume salvage takes place, it will take 40 or more years to achieve High Scenic Integrity in this viewshed. At 40 years, seedings will have reached 4-6 feet in height. Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the salvage areas and evidence of slash has been reduced, approximately five years.

Aspen regeneration treatments are proposed in this Focus Area. These units would be visible from the trail. These aspen treatments must be considered cumulatively with other treatments in the area. These aspen units will increase disturbance visible from the Spruces Trail. The aspen clone would have a “shrubbery” appearance for at least 20 years. They would provide fall color, and potential wildlife watching opportunities. Regeneration activities in these units will contribute to reducing the Scenic Integrity Level to low or very low for 10 to 20 years, when accounting for impacts from nearby slash removal and mortality.

Stream Engine Focus Area

Spruce trail area on the eastern end of Maille Creek Focus Area. Many spruce stands within the Focus Area will be harvested to below 55 square feet lineal basal area. To meet wildlife and watershed needs, and maintain a forest type structure, clumps of standing dead 1/8 to several acres in size, will be left undisturbed. This will help to reduce the visual dominance of the openings, and provide a remnant forest structure until seedlings are established. Visibility of salvage created openings will be reduced adjacent to the Dark Hollow Trail because of the no treatment zone adjacent to the trail. Beetle-killed spruce will be evident along the trail. Blowdown will be visible along the trail, increasing through time and accelerating in approximately twenty years (Schmid and Hinds, 1974). Hints, et al. (1975) and Mellec, 1980). Openings will be visible as middleground views from Brian Head Peak, the Sydney Peaks and the Spruce trails. Aspen and Hemlock Ski Resort will be visible. These will be increased contrast between openings and adjacent areas. Most viewers will perceive a diminished scenic quality in this Focus Area.

The Scenic Integrity Level is anticipated to be reduced. The level will be dependent on live tree cover remaining in a viewshed. If substantial tree cover remains from aspen or remnant spruce, the Scenic Integrity Level will be high to moderate. If openings begin to dominate the view, the Scenic Integrity Level may be reduced to Low or Very Low. The Scenic Integrity Objective for this area is High in the foreground of the Dark Hollow Trail. If high volume salvage takes place, it will take 40 or more years to achieve High Scenic Integrity in this viewshed. At 40 years, seedlings will have reached 4-6 feet in height. Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the salvage areas and evidence of slash has been reduced, approximately five years.

Bunker Creek Focus Area

Spruce mortality is evident in the western end of this Focus Area. Many spruce stands within the Focus Area will be harvested to below 55 square feet lineal basal area. To meet wildlife and watershed needs, and maintain a forest type structure, clumps of standing dead 1/8 to several acres in size, will be left undisturbed. This will help to reduce the visual dominance of the openings, and provide a remnant forest structure until seedlings are established. Visibility of salvage created openings will be reduced adjacent to the Dark Hollow Trail because of the no treatment zone adjacent to the trail. Beetle-killed spruce will be evident along the trail. Blowdown will be visible along the trail, increasing through time and accelerating in approximately twenty years (Schmid and Hinds, 1974). Hints, et al. (1975) and Mellec, 1980). Openings will be visible as middleground views from Brian Head Peak, the Sydney Peaks and the Spruce trails. Aspen and Hemlock Ski Resort will be visible. These will be increased contrast between openings and adjacent areas. Most viewers will perceive a diminished scenic quality in this Focus Area.

The Scenic Integrity Level is anticipated to be reduced from the Left Fork of Bunker Creek Trail over the first mile. The level of live tree cover remaining in a viewshed. If substantial tree cover remains from aspen or remnant spruce, the Scenic Integrity Level will be high to moderate. If openings begin to dominate the view, the Scenic Integrity Level may be reduced to Low or Very Low. The Scenic Integrity Objective for the area is High in the foreground of the Dark Hollow Trail. If high volume salvage takes place, it will take 40 or more years to achieve High Scenic Integrity in this viewshed. At 40 years, seedlings will have reached 4-6 feet in height. Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the burnt areas and evidence of slash will have been reduced, approximately five years.

Scenic Integrity could be achieved once ground cover has been reestablished in the salvage areas and evidence of slash has been reduced, approximately five years.

Dixie Creek Focus Area

Aspen regeneration treatments are proposed in this Focus Area. These units would be visible from primitive roads in the area, such as Forest Road 4726. Smoke would be visible from Highway 143 and Panquitch Lake during treatments. The aspen clones would have a “shrubbery” appearance for at least 20 years. They would still provide fall color, and potential wildlife watching opportunities. Regeneration activities in these units will contribute to reducing the Scenic Integrity Level to moderate, which would meet the Forest Plan objective of Scenic Integrity Objective of Moderate (Partial Retention).

Chicken Head Focus Area

Aspen regeneration treatments and prescribed fire in a beetle killed spruce are proposed in this Focus Area. Treated areas would be visible in the immediate foreground and foreground of the Dark Hollow Trail and Forest Road #48 where they bound the Focus Area. Impacts to scenic quality include charred bark of standing trees and down logs, and a blackened appearance to the ground plane and burnt understory plants. The visual impacts will be reduced within two ground cover plant species and the deposition of forest litter over the burnt sites. Charred bark, limbs and other features may be visible for many years.

Smoke would be visible from Highway 143, Brian Head Peak area and Brian Head Town and Resort during treatments. Burned areas will be visible as middleground from Yankee Meadows, Brian Head peak area, and may be visible as middleground from Brian Head Resort and Town.

The aspen clones would have a “shrubbery” appearance for at least 20 years. They would still provide fall color, and potential wildlife watching opportunities. In spruce-dominated areas it will take 40 or more years to achieve forest cover. At 40 years, seedlings will have reached 4-6 feet in height.

Studies have shown that visitors tend to accept burnt areas as natural events (Brunswick 1997). Factoring this into the analysis, Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the burnt areas and aspen sprouts, spruce and fir seedlings are evident, approximately five years. The Scenic Integrity Objective of High could be achieved within 20 years.

Roadless Focus Area

Aspen regeneration treatments and prescribed fire in a beetle killed spruce are proposed in this Focus Area. Treated areas would be visible as immediate foreground and foreground from the Hancock Peak trail. This trail has constructed views until reaching Rainbow Meadows to the north. These views will lengthen with less visibility of burned areas. Burning will introduce scenic variety to this trail, with more openings. Treated areas may be visible as foreground from the northern end of Cedar Breaks National Monument, and may be visible as middleground from the Red Desert Road (#240) and Highway 14. Impacts to scenic quality include charred bark of standing trees and down logs, and a blackened appearance to the ground plane and burnt understory plants. The visual impacts will be reduced within two ground cover plant species and the deposition of forest litter over the burnt sites. Charred bark, limbs and other features may be visible for many years. Smoke would be visible from Highway 143, 14 and 148, Cedar Breaks National Monument, Brian Head Peak area, Brian Head Town and Resort during treatments.

The aspen clones would have a “shrubbery” appearance for at least 20 years. They would still provide fall color, and potential wildlife watching opportunities. In spruce-dominated areas it will take 40 or more years to achieve forest cover. At 40 years, seedlings will have reached 4-6 feet in height.

Studies have shown that visitors tend to accept burnt areas as natural events (Brunswick 1997). Factoring this into the analysis, Moderate Scenic Integrity could be achieved once ground cover has been reestablished in the burnt areas and aspen sprouts, spruce and fir seedlings are evident, approximately five years. The Scenic Integrity Objective of High could be met within 20 years. Evidence of fire would not change the undeveloped character of this area, but does change the scenic quality by introducing a fire altered landscape.

CUMULATIVE EFFECTS

It is likely that visitors to the cumulative effects area will have multiple encounters with spruce beetle killed trees that sometimes dominate the view, harvest activities and evidence of fire (two Scenic- 

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No Action compared with the Salvage Component of the Proposed Action

All Focus Areas, except Hancock Peak, have already experienced high spruce mortality. Spruce present in the Hancock Peak Focus Areas, and it is anticipated that high mortality will occur within one year. In these stands the needles of the dead trees will begin to fade to a reddish brown and lose their needles over the next three years. Changes will occur in scenic quality for these stands within five years. In the immediate foreground, through the affected area, will appear more light, with less sense of closure from the loss of canopy cover. In the foreground, the texture of these stands would change as the main stems of the dead trees become a more dominant visual element. Middleground views would also be altered as the stems of dead trees become more dominant.

Within three years following lethal beetle attack spruce needles, will begin to change to a red brown color. In these areas, the landscape would dominate the view when many trees in an area were attacked during the same fire period. During the following winter, snow will strip most of the needles off, changing the texture of the view to a more course appearance, this is due to the remaining branches. Over the next five years, needles, branches and bark will begin to fall away due to snow and fall weather. The remaining stems (trunks) will begin to grow and appear as strong vertical accents against remaining living vegetation. The stands would become the dominant landscape feature and 15-16 year old aspen stands, with current and past beetle kill, would be out of character with the existing, immature continuous forest canopy. It is projected that this process of change will continue; however, it would begin to stabilize and regeneration would begin to occur.

Beyond 2010, the dead snags would gradually begin to fall. This would decrease the impact of snags in foreground and middleground views, but increase the impact to immediate foreground views. Regeneration would begin to occur, giving the appearance of a younger forest, which is more finely textured. In areas with a larger existing aspen component, aspen would be one of the first species to regenerate in affected sites.

The stands highlighted in this discussion are those stands where projected mortality is likely to cause a reduced closed canopy view and increased risk to spruce bark beetle attack, and have and will continue to experience mortality. Changes are similar to those discussed, but less dramatic and less likely to dominate the views in these stands.

Scenic Integrity is expected to be reduced to Moderate to Low where spruce mortality dominates the view. Considering the constraint factors, and no action to provide compensation for aspen recovery, no Action has an impact to scenic quality than harvest activities during the first 20-150 years. After 40 years, the harvested areas will achieve Moderate to High scenic integrity more quickly than the No Action alternative. This is the result of the continued dominance of the dead holes, both standing and down wiley harvest has not occurred in this Focus Area.

No Action compared to the Prescribed Fire Component of the Proposed Action

Throughout the short term, no action will result in little perceived change in aspen units. If no disturbance events occur over the next 90 to 100 years, the aspen will become a less dominant element in the landscape. Many aspen clones will be encroached by spruce-fir gradually over taking and sometimes destroying the clone. Other aspen clones have reached maturity and may begin to die without a disturbance event. Aspen are an important part of the Markagunt Plateau contributing to the nickname ‘Color Country’ given by travel bureaus. Loss of aspen would change the visual character of the region.

Over time no action where prescribed fire has been proposed to reintroduce fire to beetle killed spruce would be similar to no action in proposed salvage units. The progression is the same as described above, with needles fading, falling away, and leaving the tree hole or stem. Floods will eventually occur, reducing impacts to foreground due to altered vegetation patterns and the removal of aspen. Over time the dead holes are complete

CUMULATIVE EFFECTS: The presence of large numbers of dead and dying trees in this area would detract from the scenic quality of the landscape in the Spruce Ecosystem Recovery Project area. Many visitors to Cedar Breaks National Monument, Ashdown Gorge Wilderness Area, Dark Hollow and Bunker Creek Trails, and Paunicht
ALTERNATIVE B

DIRECT/INDIRECT EFFECTS. The Alternative B removes the Roadside Focus Area from the Proposed Action. This change preserves the undamaged natural-evolving landscape in the Hankook Peak Roadless Area, and does not alter the opportunity for solitude and a sense of remoteness from the sights and sounds of other humans. This alternative would eliminate the impacts of smoke to Cedar Breaks National Monument and from the Head Town. Visitors traveling Highway 148, 14 and the Red Desert Road (#241) would not be impacted by brief views fire altered landscapes, but would have increased exposure to beetle-killed spruce. With the exception of the Roadless Area Focus Area, this alternative is identical to the Proposed Action.

CUMULATIVE EFFECTS. It is likely that visitors to the CEA will have multiple encounters with spruce beetle killed trees that sometimes dominate the view, harvest activities and evidence of fire (see Scenic Resources Cumulative Effects Map, Appendix 10a and Timber Harvest Cumulative Effects Map, Appendix 10g). This will likely be experienced as diminished scenic quality for many visitors. Visitor exposure to fire altered landscapes would be reduced by eliminating prescribed fire in the Roadless Focus Area under this alternative.

SOIL RESOURCES

PROPOSED ACTION

Under the Proposed Action, there will be up to 17,821 total acres treated. There will be 2,872 acres of timber harvest, 1,013 acres of aspen regeneration, 3,995 acres of prescribed fire (292 aspen and 2,974 conifer) and 41 acres of DFS zones. There will be four miles of new road construction and one mile of temporary road construction.

DIRECT/INDIRECT EFFECTS: The adverse impacts to the soil resource due to logging, road construction and burning have been discussed in detail in a white paper titled "Effects Of Timber Harvest On The Soil Resource On The Dixie National Forest - Project File," exhibit 141, hereafter referred to as the Effects Summary.

The Effects Summary further identifies what constitutes detrimental soil disturbance and describes what the Dixie NF does to ensure that timber harvest activities do not exceed Soil Quality Standard thresholds, so that long term soil productivity is maintained.

The Proposed Action proposes to harvest timber and/or burn on soil map units 211, 221, 221A, 233, 237, 238, 238A, 299, 264A, 265, 276, 505 and 638. The Effects Summary lists a number of past timber sales and soil map units that have had a detailed soil erosion analysis. The Effects Summary identifies the soil map units where erosion monitoring should be soil erosion from logging and road construction was within soil loss tolerance thresholds and how the mitigation required that research, experience and monitoring on the Dixie NF has shown to be effective in applying within soil quality guidelines for maintaining long term soil productivity. For the SERP project area, this includes soil map units 211, 221, 233, 237, 238, 238A, and 264A.

The Effects Summary also lists soil map units for which soil erosion modeling showed that on site soil erosion from logging and road construction would exceed soil loss tolerance thresholds, regeneration success would be questionable, or other special site conditions existed. These map units are either deleted from consideration for logging or special mitigation is recommended to ensure soil quality standards are met. For the SERP project area, soil map unit 239 fits this situation. Soil map unit 239 typically has shallow erosive soils that can only be logged utilizing methods such as helicopter or water logging which results in very little ground disturbance. The particular portion of unit 239 that is proposed for logging is a small island of timber with deeper soils than is typical of 239, but was included in the 239 map unit because it was too small to delineate. This stand would actually a small area of soil map unit 238 would sustain the activity however, tractors should not be allowed to operate on the remainder of the 239 unit to gain access to this stand.

Four other soil map units (221A, 265, 276 and 638) occur in the SERP project area that have not been analyzed in the Effects Summary. The soils of these map units were analyzed for this project. The analysis showed that with the standard recommended soil and water mitigation, tractor logging these soils will not exceed soil quality guidelines.

A white paper Effects Of Fire On The Soil Resource, 1997. describes the impacts that wildfire and prescribed fire can have on the soil. In general, properly planned prescribed fire with appropriate soil and water mitigation, will have little adverse impacts on the soil resource and may have an overall beneficial impact.

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CUMULATIVE EFFECTS: The cumulative effects area for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that the proposed management does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past as well as current management activities, the proposed action, and foreseeable future management activities.

The Hankook Peak timber sale (1990-92) is a past management activity within the project area. Accelerated soil erosion associated with logging and road construction from that sale has stabilized and erosion rates should be very near pre-harvest rates. Logging associated with the Proposed Action within the old sale area will utilize skid trails and landings that were used for the Hankook Peak sale as much as possible, thereby minimizing the extent of new ground subjected to detrimental soil compaction and dispersion.

Current management activities that are occurring within the project area include livestock grazing and dispersed recreation use. Livestock use on most forested areas is minimal. Impacts to the soil resource from livestock grazing has been analyzed in Effects Of Livestock Grazing At Proper Use On The Dixie National Forest, 1997.

The cumulative impacts of on-site soil erosion from previous and current management activities combined with the proposed action associated with the Proposed Action is within soil loss tolerance thresholds for maintaining long term soil productivity. The mitigation associated with the Proposed Action will ensure that detrimental soil disturbance, particularly compaction, will not cumulatively exceed thresholds established by soil quality standards for maintenance of long term soil productivity and hydrologic function.

NO ACTION ALTERNATIVE

DIRECT/INDIRECT EFFECTS: Under the No Action alternative, erosion rates would continue at current rates. There would be no additional adverse impacts to the soil resource than currently exist.

CUMULATIVE EFFECTS: The cumulative effects area for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that the proposed management does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past as well as current management activities, the proposed action, and foreseeable future management activities.

The Hankook Peak timber sale (1990-92) is a past management activity within the project area. Accelerated soil erosion associated with logging and road construction from that sale has stabilized and erosion rates should be very near pre-harvest rates. Logging associated with the Proposed Action within the old sale area will utilize skid trails and landings that were used for the Hankook Peak sale as much as possible, thereby minimizing the extent of new ground subjected to detrimental soil compaction and dispersion.

Current management activities that are occurring within the project area include livestock grazing and dispersed recreation use. Livestock use on most forested areas is minimal. Impacts to the soil resource from livestock grazing has been analyzed in Effects Of Livestock Grazing At Proper Use On The Dixie National Forest, 1995.

There would be no additional cumulative impacts to the soil resource from the No Action alternative.

ALTERNATIVE A

Under this alternative there will be 6,081 total acres treated. There will be 2,552 acres of timber harvest, 697 acres of aspen regeneration, 2,792 acres of prescribed fire, and 41 acres of DFS zones. There will be one mile of temporary road construction.

DIRECT/INDIRECT EFFECTS: Alternative A treats the same soil map units as described under the Proposed Action. See Proposed Action for description of direct/indirect effects.

CUMULATIVE EFFECTS: See Proposed Action for a description of cumulative effects.

ALTERNATIVE B

Under this alternative there will be 5,029 total acres treated. There will be 2,287 acres of timber harvest, 1,013 acres of aspen regeneration, 1,103 acres of prescribed fire, and 41 acres of DFS zones. There will be 3 miles of new road construction and 1 mile of temporary road construction.

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DIRECT INDIRECT EFFECTS: Alternative B treats the same soil map units as described under the Proposed Action. See Proposed Action for a description of direct indirect effects.

CUMULATIVE EFFECTS: See Proposed Action for a description of cumulative effects.

COMPARISON OF ALTERNATIVES: The greatest difference between alternatives is the amount of land treated. The No Action alternative has no proposed treatment and therefore has little or no adverse impact on the soil resource. The Proposed Action and Alternatives A and B treat between 5,029 acres and 7,823 acres. They all have similar amounts of timber harvest (2,252 to 2,873 acres). Obviously, the alternatives that treat more acres will have more associated soil disturbance.

Based on the recommended soil and water mitigation measures, the amount of detrimental soil disturbance associated with any of the action alternatives will be within acceptable limits (Soil Quality Guidelines) for maintenance of long term soil productivity.

HYDROLOGY

PROPOSED ACTION

DIRECT INDIRECT EFFECTS

Hydrology: Neither logging of dead and dying trees will not increase soil moisture or water yield. Once the dead trees are removed, herbaceous plants, shrubs, and trees will establish, which will decrease local soil moisture and water yield. Surface runoff will likely increase in harvested areas due to more exposure to solar radiation. Removing dead and dying trees will also result in decreased interception of snow and rain, however the change in interception is expected to be small.

Because of the large scale tree mortality, there is more water available for soil moisture, surface runoff, and subsurface flow. There is an increased potential for surface runoff on roads and sk trails associated with logging. This is expected to be a short term risk, and will be minimized through proper layout of sk trails and implementation of SWCPs. The hydrologic effects of tractor skidding are discussed in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997).

Aspen regeneration will require either clearcutting or burning of aspen clones. This will result in increased soil moisture and on-site water yield. If regeneration is successful the effects are expected to be short term (5 years). Burning of aspen clones will result in a loss of ground cover, and on-site surface runoff may increase. The effects of burning vegetation are discussed in Effects of fire on watershed hydrology and water quality (Kendall 1997). Clearcutting of aspen would require tractor skidding to remove the trees. The hydrologic effects of tractor skidding are discussed in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997).

The proposed road construction is described in the Spruce Fucus Area (96) and in the Steam Engine Area (96). The Steam Engine road will be obliterated and closed following project completion. Approximately 1.7 miles of the Spruce Fucus road would be closed and seeded, and 1.3 miles would be converted to the Spruce wall. The proposed road construction is described in more detail by watershed, under the Cumulative Effects section. The hydrologic effects of road construction and maintenance is minimized through implementation of Soil and Water Conservation Practices (SWCP). The general effects of roads and road construction on hydrologic processes are discussed in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997).

DBS zones are proposed adjacent to major travel corridors and other land ownerships. Fuel loads would be reduced to less than 10 tons acre, which would result in less cover over the soil. The effects of fuel reduction on hydrologic processes such as infiltration and surface runoff are expected to be negligible. If mechanical means (tractor piling) are used, the effects of increased surface runoff on compacted areas and sk trails. This effect can be minimized through implementation of SWCPs. The establishment of DBS zones will reduce the risk of catastrophic fires, which in turn may reduce the risk of cumulative watershed effects. DBS zones will not be included in the cumulative effects section because cumulative effects associated with DBS zones are expected to be negligible at the watershed scale.

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Prescribed burning is proposed in the Roadless and Chicken Head Focus Areas. The effects of burning on hydrologic processes are discussed in Effects of fire on watershed hydrology and water quality (Kendall 1997a).

Water Quality:

The general effects of logging, tractor skidding, and road construction on water quality are described in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997). In general, the effects of logging, tractor skidding, road construction, and burning on water quality is highly dependent upon the extent to which hydrologic processes (i.e. infiltration, surface runoff, etc.) are impaired or altered.

Water quality will be protected by implementing SWCPs, and through site specific prescriptions within and adjacent to riparian ecosystems. Therefore, it is assumed that long term water quality will be protected. The basis for site specific prescriptions within and adjacent to riparian ecosystems is described in the following section.

In 1993, the Utah Department of Environmental Quality and the Utah National Forests agreed through a Memorandum of Understanding, to use Forest Plan Standard & Guidelines and the Forest Service Handbook (FSH) 2509.22 SWCPs to meet the water quality protection elements of the Utah Nonpoint Source Management Plan.

Channel Morphology and Riparian Ecosystems:

Riparian ecosystems, and land adjacent to them, will be given special management consideration to protect riparian values, channel morphology, and water quality. During the implementation phase of the project, an interdisciplinary team will provide site specific prescriptions designed to protect or enhance riparian conditions and water quality. In general, harvest and/or ground disturbance would not likely occur within 50 feet of any stream channel ephemeral, intermittent, or perennial, spring, seep, or wetland. Where field reviews and site specific prescriptions are not completed, the following guidelines will be implemented:

- Perennial, fish-bearing streams: No harvest, ground disturbance, or burning within 200 feet of the edge of riparian vegetation.
- Perennial, non-fish-bearing streams: No harvest, ground disturbance, or burning within 100 feet of the edge of riparian vegetation.
- Intermittent and ephemeral channels: No harvest, ground disturbance, or burning within 50 feet of the edge of riparian vegetation or channel.
- Ponds, lakes, seeps, and wetlands: No harvest, ground disturbance, or burning within 50 feet of the edge of riparian vegetation or seasonally saturated soil.

CUMULATIVE EFFECTS: Baseline cumulative effects analyses have been completed on all of the Cumulative Effects Watersheds (CEW) using the Watershed Risk Rating (USDA 1993), and the Modified Equivalent Road Area (ERA) procedure described by McGark and Fong (1995). The Watershed Risk Rating describes the relative risk (low, moderate, or high) of cumulative effects (i.e. sedimentation, channel and aquatic habitat degradation, etc.) resulting from increased water yields, peak flows, and/or excessive erosion. The Watershed Risk Rating is based on road density and past vegetation disturbances (i.e. timber harvest, mortality, and fires). The Modified ERA is an index or expression of the relative amount of disturbance within a Streamside Impact Zone (SIZ), and is expressed as a percentage of the total SIZ area. McGark and Fong (1995) identified a threshold of 5% ERA, above which macroinvertebrate diversity declined with increasing ERA values. In this analysis, 5% ERA within the SIZ will be considered a threshold of concern. The Watershed Risk Model will be used to address cumulative watershed effects in terms of hydrology (i.e. peak flows, increased water yields, etc.) and erosion. The Modified ERA model will be used to address cumulative effects in terms of water quality.
Table 4.2. Summary of conditions within the Cumulative Effects Watersheds.

<table>
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<th>CEW</th>
<th>Road Density</th>
<th>Spruce Mortality</th>
<th>Relative Risk of</th>
<th>Modified ERA</th>
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<tbody>
<tr>
<td></td>
<td>(mi/ha²)</td>
<td>(% of Watershed)</td>
<td>&quot;CW-E&quot;</td>
<td></td>
</tr>
<tr>
<td>Center Creek</td>
<td>0.67</td>
<td>1601/200</td>
<td>Moderate</td>
<td>1.0</td>
</tr>
<tr>
<td>Clear Creek</td>
<td>0.52</td>
<td>235/27</td>
<td>Low</td>
<td>1.9</td>
</tr>
<tr>
<td>Blue Springs Creek</td>
<td>1.44</td>
<td>1743/16.9</td>
<td>Low</td>
<td>3.0</td>
</tr>
<tr>
<td>Mammot Creek</td>
<td>2.29</td>
<td>3670/15.0</td>
<td>Low</td>
<td>5.6</td>
</tr>
<tr>
<td>Tomato Creek</td>
<td>1.21</td>
<td>27/10</td>
<td>Low</td>
<td>2.0</td>
</tr>
<tr>
<td>Malheur Creek</td>
<td>3.16</td>
<td>265/2.9</td>
<td>Moderate</td>
<td>2.5</td>
</tr>
</tbody>
</table>

1 Cumulative Watershed Effects
2 Modified Equivalent Roded Area

In watersheds where salvage timber harvest is proposed, the main activity that would affect water quantity and water quality is tractor skidding and road construction. Because the source stands that would be harvested are already drained and losing water, the effects of harvesting on water yields would be negligible and uncontrollable. Through monitoring of past timber sales harvested by the BLM, it has been determined that approximately 10% of harvest units consist of skid trails (Baxter 1997). Any surface runoff and/or erosion would be expected to occur on skid trails or roads. Therefore, approximately 1% of the harvest acreage is expected to be impacted by harvest activities. Some of the aesthetic treatments may require tractor skidding for removal as well.

The long-term effects of aspen treatments on water quantity and quality are expected to be negligible, assuming SWCPs and other mitigations are implemented properly. Harvesting or burning of aspen will increase on-site soil moisture and water yields, but increased water yields would not likely be measurable at the watershed scale. Burning of aspen stands will result in less ground cover, and surface runoff and erosion would likely accelerate and hydrologic recovery occurs approximately 5 years, and ground cover is reestablished.

The Modified ERA increases associated with proposed activities are calculated without considering any treatment of existing stream channels, and assuming aspen treatments will require tractor skidding for removal. Therefore, the predicted increase in ERAs associated with each Proposed Action is over-estimated, and represents the worst case scenario. Actual increases in the Modified ERAs will likely be 30-50% lower than predicted.

All proposed activities will require implementation of applicable SWCPs. (Appendix 5) to protect water quality and associated Benefits. Use SWCPs designed to minimize or prevent long term erosion on disturbed sites. Water quality impacts from timber harvesting is most commonly associated with sedimentation resulting from road construction and tractor skidding. Implementation of SWCPs can prevent or minimize soil loss and associated water quality degradation. Monitoring of past timber sales on the Cedar City Ranger District during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation. If erosion on disturbed sites is controlled or prevented, it is assumed that water quality degradation, associated with sedimentation, will be prevented.

Spruce Ecosystem Recovery Project

- Intermittent and ephemeral channels: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or channel.
- Ponds, lakes, seeps, and wetlands: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or seasonally saturated soil.

Through site specific prescriptions and/or implementation of the above guidelines, there will be no long term impacts to channel morphology, water quality, or riparian/aquatic habitat resulting from the Proposed Actions.

Center Creek Watershed

Land uses within the Center Creek watershed include livestock grazing, dispersed recreation, and roads. Approximately 1900 acres (29% of the watershed) has been impacted through spruce mortality. Eight acres were harvested in 1996 as part of the Sidney Valley Recovery Project.

The Center Creek CEW is at moderate risk of cumulative watershed effects mainly because of the large scale spruce mortality. However, the Modified ERA is relatively low (1.0), and water quality is excellent in the upper reaches according to aquatic macroinvertebrate data. There is no information on stream channel or riparian conditions within the watershed.

The Proposed Actions within the Center Creek watershed include up to 0.5 miles of road construction, 251 acres or salvaging logging, and 1102 acres of prescribed burning. Long term impacts to hydrologic processes and water quality associated with the road because the road is not in the vicinity of any stream courses, and would be obliterated and closed following project completion.

Salvaging logging would occur within the Stream Engine Focus Area, located in the upper watershed, and contains 2 small ephemeral/intermittent channels. No ground disturbance would be allowed within at least 50 feet of these channels to minimize sedimentation from skid trails. Salvage logging of this area will accelerate the regeneration process by approximately 10 years. The long term effects of this action may slightly reduce the risk of cumulative watershed effects (CEWs) over a shorter period of time due to the accelerated regeneration of forest cover. Proper implementation of SWCPs will ensure protection of water quality from sedimentation. The Modified ERA would increase no more than 0.3% as a result of salvage logging. Therefore, the proposed logging is not expected to adversely affect long term water quality.

Prescribed burning is proposed on 1101 acres within the Chicken Head Focus Area, which contains 2 small ephemeral/intermittent channels. The effects of fire on hydrologic processes and water quality are discussed in the Effects on Fire on Watershed Hydrology and Water Quality (Kendall 1997a). The Chicken Head area is at high risk of catastrophic fire, due to high fuel loads (Fay 1997). Prescribed fire is proposed to reduce the risk of catastrophic wildfire, by decreasing fuel loads under controlled conditions.

Burning of live forest stands may increase the risk of CW-E's peak flows, channel degradation, sedimentation, and associated water quality degradation) until hydrologic recovery occurs (approximately 3.5 years for aspen and 30 years for spruce). However, burning would reduce fuel loads, which in turn, would reduce the risk of catastrophic wildfire. Overall, the long term risk associated with wildfire, because prescribed fire can be controlled and made sensitive to soil and water resources. Field reviews will be conducted prior to any prescribed fires by an Interdisciplinary Team, including a Hydrologist. Prescribed fires will be designed to provide optimum protection of watershed function and water quality.

Clear Creek Watershed

Land uses within the watershed include roads, timber harvest, and livestock grazing. The lower portions of the watershed are privately owned, but are leased. Approximately 1609 acres of this watershed was harvested (salvage/sanitation) in 1994 as part of the Ranger Creek Recovery Project. The Clear Creek watershed is at high risk of CW-E's, and has a Modified ERA of 1.9. There is no information on current conditions of stream channels and associated riparian areas within the watershed.

The Spruce Focus Area lies in the headwaters of the Clear Creek watershed. Proposed Actions within this CEW include approximately 1.2 miles of new road construction, 232 acres of salvaging logging, and 143 acres of aspen treatments. The proposed road lies in the headwaters of the watershed close to the drainage divide, and would cross a small draw. The road would be closed and seeded following project completion. It is unlikely that any sediment
from the road would reach any stream courses, except where the road crosses a small draw. Implementation of SWCPs will minimize or prevent any sediment from reaching perennial waters. Following project completion, the road will continue to be a source of surface runoff and sediment until vegetative cover is established and the cut and fill slopes stabilize. Sediment production is expected to decrease over time.

Salvage logging of dead spruce will accelerate regeneration of forest cover and reduce the risk of CWEs over a shorter period of time. Salvage logging, combined with proposed aspen treatments would increase the Modified ERA no more than 0.2%. Therefore, long-term adverse impacts to water quality are not expected.

**Blue Springs Creek Watershed**

The dominant land uses within the Blue Springs Creek watershed include livestock grazing, dispersed recreation, roads, and timber harvest. Approximately 1745 acres has been impacted by spruce beetle, and 1997 acres were harvested as part of the Panthie Lake Recovery Project in 1994. The Blue Springs Creek CEW is at low risk of CWEs, and has a Modified ERA value of 3.0%. Deer Creek, a tributary to Blue Springs Creek is severely degraded due to increased stream flows from the Castle Creek diversion. The stream banks and hillslopes are actively eroding. The risk level and Modified ERA are not sensitive to the type of proposed management of Deer Creek. Detailed descriptions of Deer Creek are available in the Panthie Lake Recovery Project Watershed Analysis Report, and the Deer Creek Level II Repair/Inventory. These documents are available in the SERP project file.

The Focus Areas that lie within the Blue Springs Creek CEW include Spruces, Banker, and Deer Creek. Proposed actions include establishment of 1.8 miles new road construction located in the headwaters near the drainage divides, 233 acres of salvage logging, and 544 acres of aspen treatments. The first 1.3 miles of the road will be converted to the Spruces trail following project completion, and the old section of the 3/4 miles trail would be rehabilitated, seeded, and closed. The remaining 0.5 miles of the road will be closed and seeded.

The proposed road lies in the headwaters of the Banker Creek drainage, and would cross 2 ephemeral/intermittent channel, and one small draw. Application SWCPs will be implemented at the channel crossings to minimize or prevent any sediment entering the channels. Construction of this road will increase the Modified ERA by approximately 0.0144 percent. Following project completion, 0.5 miles of the road will be closed and seeded. The road will continue to be a source of surface runoff and sediment until vegetative cover is established and the cut and fill slopes stabilize. Sediment production is expected to decrease, as vegetation becomes re-established. No long-term impacts to water quality are expected to result from the proposed road construction, assuming SWCPs are implemented and the road is effectively vegetated and closed. The section of road that will be converted to the Spruces trail would be open to hiking and mountain biking. The trail will continue to be a source of runoff and sediment, however, these effects can be minimized by seeding the cut and fill slopes, and providing proper drainage. The effects of the trail on hydrologic processes and water quality are expected to be negligible at the watershed scale.

Salvage logging may lower the risk of CWEs over a shorter period of time by accelerating regeneration of forest cover. The Modified ERA would increase no more than 0.6% as a result of salvage logging and aspen treatments combined. Therefore, no long-term adverse impacts to hydrologic processes and water quality are expected.

**Mammoth Creek Watershed**

The Mammoth Creek watershed is at low risk and contains a Modified ERA value of 5.6%. The Modified ERA value is relatively high, and above the threshold of concern in this watershed. This is due mainly to private land development in the Mammoth Creek subdivision, which is downstream of the project area. Aquatic macroinvertebrate data taken from the Mammoth Creek/Comstock Creek confluence indicates water quality is good. Land uses within the Mammoth Creek CEW include roads, livestock grazing, timber harvest, dispersed recreation, and private land development. Past timber harvests within the Mammoth Creek CEW are listed in Table 4.3. The Mammoth Creek Recovery Project is currently being implemented at various locations within the Mammoth Creek CEW.

**Tommy Creek Watershed**

The Tommy Creek CEW is at low risk of cumulative effects, and has a Modified ERA value of 2.0%. Approximately 1419 acres of this watershed was harvested in 1993 under the Tippens Valley Recovery Project, and approximately 64 acres was harvested in 1984 under the Saguaro Project.

Water quality in lower Tommy Creek is poor, based on aquatic macroinvertebrate data collected in 1996. The water quality degradation is believed to be caused by runoff and erosion from the Mammoth Creek subdivision. Land uses within the watershed include livestock grazing, roads, dispersed recreation, timber harvest, and private land development.

The Roadless Area Focus Areas lie within the Tommy Creek CEW. Proposed fire is proposed on 1512 acres within the Focus Area. Approximately 664 acres of salvage treatments are under way in the lower Tommy Creek CEW under the Mammoth-Duck Creek Recovery Project. The Roadless Focus Areas lie in the upper portion of the Tommy Creek CEW. This portion of the watershed contains expansive lava beds, and there are no stream channels. The effects of prescribed burning on long term water yield is expected to be negligible because much of the burning will occur in aspen stands which recover rapidly, and the acreage will be burned over a course of years, as opposed to all at once. There will be no adverse effects to water quality because there are no stream channels in the immediate vicinity of the Focus Area.

**Midway Creek Watershed**

The Midway Creek CEW is at moderate risk of cumulative watershed effects mainly because of high road density (3.18 miles/%) . The Modified ERA in this watershed is 2.5%. All of the streams in the CEW are intermittent and ephemeral, and they drain to Duck Lake during spring snowmelt and high intensity thunderstorms. Land uses within the watershed include dispersed recreation, roads, livestock grazing, and timber harvest. Past timber harvests that have been implemented in the Midway CEW are summarized in Table 4.4.
Table 4-4. Past Treatments in the Midway Creek CEW.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Year</th>
<th>Treatment Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midway Face</td>
<td>1996</td>
<td>416</td>
</tr>
<tr>
<td>Blowhard #2</td>
<td>1989</td>
<td>1729</td>
</tr>
<tr>
<td>Sage Valley</td>
<td>1984</td>
<td>889</td>
</tr>
<tr>
<td>Deer Salvage</td>
<td>1976</td>
<td>382</td>
</tr>
<tr>
<td>Deer Valley</td>
<td>1969</td>
<td>528</td>
</tr>
</tbody>
</table>

The Proposed Action includes prescribed fire on approximately 1187 acres within the Roadless Focus Area. The long term effects of this action on water quality is expected to be negligible at the watershed scale. Water quality will be protected through implementation of site specific prescriptions and SWCPs adjacent to stream channels. Duck Creek begins to flow at Duck Springs (Duck Lake). Any sediment that is transported down Midway Creek is deposited in Duck Lake, therefore, water quality in Duck Creek would not likely be affected by the Proposed Action as it is water quality within the CEW. The Modified ERA would not be applicable to burning, therefore, it is not used to describe the potential impacts in this watershed.

NO ACTION ALTERNATIVE

DIRECT/INDIRECT EFFECTS

No treatment of dead and dying trees stands will delay regeneration by approximately 10 years, hence soil moisture and on-site water yield increases would persist for a slightly longer period of time. Implementation of this alternative would have no long term adverse impacts to hydrologic processes or water quality.

CUMULATIVE EFFECTS

Implementation of this alternative would not have any adverse effects to hydrologic processes or water quality in any of the cumulative effects watersheds.

ALTERNATIVE A

DIRECT/INDIRECT EFFECTS

Hydrology

The direct and indirect effects of salvage logging, aspen regeneration, and establishment of DFS zones are discussed under the Proposed Action.

New road construction as proposed in the Steam Engine Focus Area up to 0.5 mi. This road would be obliterated and closed upon completion of the project. The hydrologic effects of road construction and maintenance will be minimized through implementation of SWCPs. The general effects of roads and road construction on hydrologic processes are discussed in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997).

Long term effects of the proposed road on hydrologic processes is expected to be negligible.

Prescribed burning is proposed in the Roadless Focus Areas. The effects of burning on hydrologic processes are discussed in Effects of fire on watershed hydrology and water quality (Kendall 1997a).

Water Quality

The general effects of logging, tree skidding, and road construction on water quality are discussed in Effects of timber harvest on watershed hydrology and water quality (Kendall 1997). The effects of burning on water quality are described in Effects of fire on watershed hydrology and water quality (Kendall 1997a). In general, the effects of logging, tree skidding, road construction, and burning on water quality is highly dependent upon the extent to which hydrologic processes i.e. infiltration, surface runoff, etc. are impaired or altered.

Water quality will be protected by implementing SWCPs and through site specific prescriptions within and adjacent to riparian ecosystems. Therefore, it is assumed that long term water quality will be protected.

Cedar City Ranger District

In 1993, the Utah Department of Environmental Quality and the Utah National Forests agreed, through a Memorandum of Understanding, to use Forest Plan Standard & Guidelines and the Forest Service Handbook (FSHB) 2509.22 SWCPs to meet the water quality protection elements of the Utah Nonpoint Source Management Plan.

Channel Morphology And Riparian Ecosystems

The direct and indirect effects on channel morphology and riparian ecosystems are discussed under the Proposed Action.

CUMULATIVE EFFECTS

A pratical discussion of Cumulative Watershed Effects is located under the Proposed Action. Cumulative Watershed Effects, specific to each watershed in the Project Area, are described below.

Center Creek Watershed

Land uses within the Center Creek watershed include livestock grazing, dispersed recreation, and roads. Approximately 1800 acres (29%) of the watershed has been impacted by spruce mortality. Eight acres were harvested in 1996 as part of the Sidney Valley Recovery Project.

The Center Creek CEW is at moderate risk of cumulative watershed effects mainly because of the large scale spruce mortality. However, the Modified ERA is relatively low (10%) and water quality is excellent in the upper reaches according to aquatic macroinvertebrate data. There is no information on stream channel or riparian conditions within the watershed.

The Proposed Actions within the Center Creek watershed include up to 0.5 miles of road construction and 251 acres of salvage logging. Long term impacts to hydrologic processes and water quality associated with the road construction would be negligible because the road is not in the vicinity of any stream courses, and would be obliterated and closed following project completion.

Salvage logging would occur within the Steam Engine Focus Area located in the upper watershed, and contains 2 small ephemeral/instantaneous channels. No ground disturbance would be allowed in the first 30 feet of these channels to minimize sedimentation from 4x4 trails. Salvage logging of this area will accelerate the regeneration process by approximately 10 years. The long term effects of this action may slightly reduce the risk of CWEs over a shorter period of time due to the accelerated regeneration of forest cover. Proper implementation of SWCPs will ensure protection of water quality from sedimentation. The Modified ERA would increase to no more than 17% as a result of salvage logging. Therefore, the proposed logging is not expected to adversely affect long term water quality.

Blue Springs Creek Watershed

The dominant land uses within the Blue Springs Creek CEW include livestock grazing, dispersed recreation, roads, and timber harvest. Approximately 1741 acres has been impacted by spruce mortality and 957 acres were harvested as part of the Panpuch Lake Recovery Project in 1994.

The Blue Springs Creek CEW is at low risk of cumulative watershed effects, and has a Modified ERA value of 30%. Deer Creek, a tributary to Blue Springs Creek is severely degraded due to increased stream flows from the Castle Creek diversion. The stream banks and hilltops are actively eroding. The risk level and Modified ERA are not sensitive to the type of impacts associated with Deer Creek. Detailed descriptions of Deer Creek are available in the Panpuch Lake Watershed Analysis Report and the Deer Creek Level II Riparian Inventory. These documents are available in the SERP project file.

The Focus Areas that lie within the Blue Springs Creek CEW include Banker and Deer Creek. Proposed Actions within this watershed include approximately 210 acres of salvage logging, and 500 acres of aspen treatments.

Salvage logging may lower the risk of CWEs in a shorter time period by accelerating regeneration of forest cover. Aspen treatments are not expected to affect long term water quantity and quality. The Proposed Action will increase no more than 0.6% as a result of salvage logging and aspen treatments combined. Therefore, no long term adverse impacts to hydrologic processes and water quality are expected.

Mammouth Creek Watershed

The Mammouth Creek CEW is at low risk and contains a Modified ERA value of 5.6%. The Modified ERA is relatively high, and above the threshold of concern in this watershed. This is due mainly to private land development in the Mammouth Creek subdivision which is downstream of the project area.

Spruce Ecosystem Recovery Project
The proposed action includes prescribed fire on approximately 1187 acres within the Roadless Focus Area. The long term effects of this action on water quantity is expected to be negligible at the watershed scale. Water quality will be protected through implementation of site specific prescriptions and SWCPs adjacent to stream channels. Duck Creek begins to flow at Duck Springs (Duck Lake). Any sediment that is transported down Duck Creek is deposited in Duck Lake, therefore, water quality in Duck Creek would not likely be affected by the Proposed Action or other management activities within the CEW. The Modified ERA model is not applicable to burning, therefore it is not used to describe the potential effects in this watershed.

**ALTERNATIVE B**

**DIRECT/INDIRECT EFFECTS:**

**Hydrology:**

The direct and indirect effects of salvage logging, aspen regeneration, and establishment of DFS zones are discussed under the Proposed Action.

New road construction is proposed in the Spruces Focus Area (3 mi) and in the Steam Engine Focus Area (up to 0.5 mi). The Steam Engine road will be obliterated and closed following project completion. Approximately 1.7 miles of the spruces road would be closed and seeded, and 1.3 miles would be converted to the Spruces trail. The proposed road construction is described in more detail, by watershed, under the Cumulative Effects section. The hydrologic effects of road construction and maintenance are minimized through implementation of SWCPs. The general effects of roads and road construction on hydrologic processes are discussed in: Effects of timber harvest on watershed hydrology and water quality (Kendall 1997a).

Prescribed burning is proposed in the Chicken Head Focus Area. The effects of burning on hydrologic processes are discussed in: Effects of fire on watershed hydrology and water quality (Kendall 1977a).

**Water Quality:**

The general effects of logging, trapper skidding, and road construction on water quality are described in: Effects of timber harvest on watershed hydrology and water quality (Kendall 1997a). The effects of burning on water quality are described in: Effects of fire on watershed hydrology and water quality (Kendall 1997a). In general, the effects of logging, trapper skidding, road construction, and burning on water quality is highly dependent upon the extent to which hydrologic processes (i.e. infiltration, surface runoff, etc.) are impaired or altered.

Water quality will be protected by implementing SWCPs and through site specific prescriptions within and adjacent to riparian ecosystems. Therefore, it is assumed that long term water quality will be protected. The basis for site specific prescriptions are described under the Proposed Action.

In 1993, the Utah Department of Environmental Quality and the Utah National Forests agreed, through a Memorandum of Understanding, to use Forest Plan Standard & Guidelines and the Forest Service Handbook (FSH) 2509.22 SWCPs to meet the water quality protection elements of the Utah Nonpoint Source Management Plan. **Channel Morphology And Riparian Ecosystems:**

The direct and indirect effects on channel morphology and riparian ecosystems are discussed under the Proposed Action.
CUMULATIVE EFFECTS. A general discussion of Cumulative Watershed Effects is located under the Proposed Action. Cumulative Watershed Effects, specific to each watershed in the Project Area, are discussed below.

Center Creek Watershed

Land uses within the Center Creek watershed include livestock grazing, dispersed recreation, and roads. Approximately 1800 acres (20%) of the watershed has been impacted by sparse mortality. Eight acres were harvested in 1996 as part of the Sandy Valley Recovery Project.

The Center Creek CEW is at a moderate risk of cumulative watershed effects mainly because of the large scale sparse mortality. However, the Modified ERA is relatively low (1.9%), and water quality is excellent in the upper reaches according to aquatic macroinvertebrate data. There is no information on stream channel or riparian conditions within the watershed.

The Proposed Actions within the Center Creek watershed include up to 0.5 miles of road construction, 225 acres of salvage logging, and 1102 acres of prescribed burning. Long term impacts to hydrologic processes and water quality associated with the road construction would be negligible because the road is not in the vicinity of any stream courses, and would be obliterated and closed following project completion.

Salvage logging would occur within the Stream Engine Focus Area, located in the upper watershed, and contains 2 small ephemeral/intermittent channels. No ground disturbance would be allowed within at least 50 feet of these channels to minimize sedimentation from skid trails. Salvage logging of this area will accelerate the regeneration process by approximately 10 years. The long term effects of this action may slightly reduce the risk of CWS over a shorter period of time. Implementation of SWCPs will ensure protection of water quality from sedimentation. The Modified ERA would increase no more than 0.3% as a result of salvage-logging. Therefore, the proposed logging is not expected to adversely affect long term water quality.

Prescribed burning is proposed on 1101 acres within the Chicken Head Focus Area, which contains 2 small ephemeral/intermittent channels. The effects of fire on hydrologic processes and water quality are discussed in Ecosystems at Risk: Water Quality and Water Resources (1997). The prescribed burning is proposed to reduce the risk of catastrophic wildfire, by decreasing fuel loads under controlled conditions.

Burning of live forest stands may increase the risk of CWS (peak flows, channel degradation, sedimentation, and associated water quality degradation) until hydrologic recovery occurs, which is approximately 3-5 years for 30-year return period fire. After 30 years, burning would reduce fuel loads, which in turn, would reduce the risk of catastrophic wildfire. Overall, the long term risk associated with prescribed fire will be lower than that associated with wildlife, because prescribed fire can be controlled and made sensitive to soil and water resources. Field reviews will be conducted prior to any prescribed fires by an Interdisciplinary Team, including a Hydrologist. Prescribed fires will be designed to provide optimum protection of watershed function and water quality.

Clear Creek Watershed

Land uses within the Clear Creek watershed include roads, timber harvest, and livestock grazing. The lower portions of the watershed are privately owned but undeveloped. Approximately 1609 acres of this watershed was harvested (salvage treatment) in 1994 as part of the Panthach Creek Recovery Project.

The Clear Creek CEW is at low risk of cumulative watershed effects, and has a Modified ERA of 1.9%. There is no information of current conditions of stream channels and associated riparian areas within the watershed.

The Spruces Focus Area lies in the headwaters of the Clear Creek watershed. Proposed Actions within this CEW include road construction, construction of new road construction, 232 acres of salvage logging, and 1102 acres of prescribed burning treatments. The proposed road lies in the headwaters of the watershed close to the drainage divide, and would cross a small stream. The road would be closed and sealed following project completion. It is unlikely that any sediment from the road will reach any stream courses, except where the road crosses a small stream. Implementation of SWCPs will minimize or prevent any sediment from reaching perennial waters. Following project completion, the road will be revegetated. Construction of this source of surface runoff and sediment until vegetative cover is established and the cut and fill slopes stabilize. Sediment production is expected to decrease over time.

Environmental Consequences

Salvage logging of dead spruce will accelerate regeneration of forest cover and may reduce the risk of CWS over a shorter period of time. Salvage logging, combined with proposed aspen treatments would increase the Modified ERA no more than 0.2%. Therefore, long term adverse impacts to water quality are not expected.

Blue Springs Creek Watershed

The dominant land uses within the Blue Springs Creek CEW include livestock grazing, dispersed recreation, roads, and timber harvest. Approximately 1743 acres has been impacted by spruce beetle, and 1997 acres were harvested as part of the Panguitch Lake Recovery Project in 1994.

The Blue Springs Creek CEW is at a low risk of cumulative watershed effects, and has a Modified ERA value of 3.9%. Deer Creek, a tributary to Blue Springs Creek is severely degraded due to increased stream flows from the Castle Creek drainage. The stream banks and hill slopes are actively eroding. The risk level and Modified ERA are not sensitive to the type of impacts associated with Deer Creek. Detailed descriptions of Deer Creek are available in the Panguitch Lake Watershed Analysis Report, and the Deer Creek Level II Riparian Inventory. These documents are available in the project file.

The Focus Areas that lie within the Blue Springs Creek CEW include Spruces, Bunker, and Deer Creek. Proposed Actions within this watershed included 1.8 miles new road construction located in the headwaters near the drainage divide, 233 acres of salvage logging, and 534 acres of aspen treatments. The first 1.3 miles of the road will be converted to the Spruces trail following which the Spruces trail will be rehabilitated, seeded, and closed. The remaining 0.5 miles of the road will be closed and seeded.

The proposed road lies in the headwaters of the Bunker Creek drainage, and would cross 2 ephemeral/intermittent channels and one small drain. Applicable SWCPs will be implemented at the channel crossings to minimize or prevent any sediment from entering the channel. Construction of this road will increase the Modified ERA by approximately 0.04 percent. Following project completion, 0.5 miles of the road will be closed and seeded. The road will continue to be a source of surface runoff and sediment until vegetative cover is established and the cut and fill slopes stabilize. Sediment production is expected to decrease, as vegetation becomes re-established. No long term impacts to water quality are expected to result from the proposed road construction, assuming SWCPs are implemented and the road is effectively revegetated and closed. The section of road that will be converted to the Spruces trail would be open to hiking and mountain bike. The trail will continue to be a source of surface runoff and sediment, however, these effects can be minimized by seeding the cut and fill slopes, and providing proper drainage. The effects of the trail on hydrologic processes and water quality are expected to be negligible at the watershed scale.

Salvage logging will lower the risk of CWS by accelerating regeneration of forest cover. The Modified ERA will increase no more than 0.6% as a result of salvage logging and aspen treatments combined. Therefore, no long term adverse impacts to hydrologic processes and water quality are expected.

Mammoth Creek Watershed

The Mammoth Creek CEW is at low risk and contains a Modified ERA value of 5.6%. The Modified ERA value is relatively high, and above the threshold of concern in this watershed. This is due mainly to private land development in the Mammoth Creek subdivision, which is downstream of the Project Area. Aquatic macroinvertebrate data taken from the Mammoth Creek/Tommy Creek confluence indicates water quality is good. Land uses within the Mammoth Creek CEW include roads, livestock grazing, dispersed recreation, and private land development. Past timber harvests within the Mammoth Creek CEW are listed in Table 4-2. The Mammoth-Duck Creek Recovery Project is currently being implemented at various locations within the Mammoth Creek CEW.
Table 6-7. Past Treatments in the Mammoth Creek CEW.

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>YEAR</th>
<th>TREATMENT ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidney Valley</td>
<td>1996</td>
<td>1802</td>
</tr>
<tr>
<td>Rainbow Meadows</td>
<td>1996</td>
<td>414</td>
</tr>
<tr>
<td>Hancock Peak</td>
<td>1991</td>
<td>2199</td>
</tr>
<tr>
<td>Lowered Creek</td>
<td>1979</td>
<td>219</td>
</tr>
</tbody>
</table>

The Bunker, Lowered/State, and Hancock Peak Focus Areas lie within the Mammoth Creek CEW. A very small portion (≤100 acres) of the Bunker Focus Area is also within the CEW. Proposed Actions include 2033 acres of salvage/salvage harvesting, and 335 acres of aspen treatments. Approximately 358 acres of salvage/salvage treatment are proposed on the lower end of the CEW under the Mammoth-Duck Creek Recovery Project.

The long term effects of the proposed logging may result in a lower risk of CCE due to accelerated regeneration of forest cover. The Modified ERA will increase no more than 0.8% as a result of salvage logging and aspen treatments. Because the Modified ERA is presently above the threshold of concern, site specific prescriptions within and adjacent to riparian ecosystems will be designed to minimize any increases in the Modified ERA.

Table 4-8. Comparison of Alternatives.

<table>
<thead>
<tr>
<th>WATERSHED</th>
<th>ACRES DISTURBED / PERCENTAGE OF CEW</th>
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</thead>
<tbody>
<tr>
<td>Cumulative Effects</td>
<td>Proposed Action</td>
</tr>
<tr>
<td>Center Creek</td>
<td>1128 / 11.6</td>
</tr>
<tr>
<td>Clear Creek</td>
<td>41 / 0.5</td>
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<tr>
<td>Blue Springs Creek</td>
<td>82 / 0.8</td>
</tr>
<tr>
<td>Mammouth Creek</td>
<td>242 / 1.0</td>
</tr>
<tr>
<td>Tommy Creek</td>
<td>1519 / 8.9</td>
</tr>
<tr>
<td>Midway Creek</td>
<td>1187 / 11.6</td>
</tr>
</tbody>
</table>

**FISHERIES RESOURCE**

DIRECT/INDIRECT EFFECTS: The Proposed Action for the Spruce Ecosystem Recovery Project is similar to and within the scope of the previous environmental analysis and implemented projects which have comparable affected environments. The environmental effects are similar to those described in the Tippets Valley Timber Harvest EIS. Sidney Valley Recovery Project EA, Rainbow Meadow Recovery Project EA, Pangunuk Lake Recovery Project EA, Blue Springs/Reeds Valley Recovery Project EA. Effects of Timber Harvest and Related Activities on Fish and Aquatic Macroinvertebrates (Robertson 1997), and Effects of Fire on Fish and Aquatic Macroinvertebrates (Robertson 1997).

There are several potential effects to aquatic habitats and associated species that can result from timber harvest. These include increased solar radiation, decreased supply of large woody debris, erosion of streambanks, addition of logging slash (needles, bark, branches), altered streamflow regime, accelerated surface erosion, increased nutrient runoff, and inputs of fine inorganic and organic matter. These are discussed in greater detail in Robertson, 1997, Effects of Timber Harvest and Related Activities on Fish and Aquatic Macroinvertebrates.

Prescribed fire can also affect aquatic habitat and biota. Direct effects include burning or abrupt changes in water chemistry (Mills et al. 1989, McMahon and DeClestra 1990, Rime 1990). Indirect effects include changes to the hydrologic regime, erosion, debris flows, woody debris, and riparian cover (Swanson and Lienkaemper 1978, Brown 1989, Megahan 1991, Borek and Young 1993, and Robertson, pers. obs.). All of these effects are dependent on numerous factors including fire intensity, its extent and location within a watershed, the amount and type of fuel consumed and left, soil type, and the frequency, timing, and intensity of precipitation events.

The primary potential for directly or indirectly impacting fish, aquatic macroinvertebrates, or aquatic habitats would be from the introduction of fine sediment to the streams. These impacts are well documented in the literature (Koshi 1996, Meehan and Swanson 1977, Everest et al. 1987). Fine sediment can change the species composition, diversity, and abundance of macroinvertebrates as well as suffocating trout eggs and fry. The tributaries which have potential to increase sediment to the streams are activities associated with timber harvest, including roads and skid trails, and prescribed fire. These effects are dependent, however, on their location and extent of treatment.

In order to minimize the impacts to the aquatic environment, Soil and Water Conservation Practices (SWCP's) will be implemented during road construction, timber harvest, and prescribed fire activities. These are discussed further in Chapter 4 - Hydrology. In addition Riparian ecosystems will be given special management consideration to protect riparian values, channel morphology, and water quality. During project implementation, an interdisciplinary

Environmental Consequences

Forest cover. The aspen treatments will maintain vegetative diversity, which will lower the risk of large wildfires and associated watershed disturbance. The main disadvantages of the Proposed Action and Alternative B is the road construction because it is difficult to effectively close roads following project completion.

Blue Springs Creek Watershed

The Proposed Action and Alternative B would include new road construction, salvage logging, and aspen treatments. Alternative A would involve the same actions as above, excluding road construction. The disadvantage associated with the Proposed Action and Alternative B is the road construction because it is difficult to effectively close roads following project completion. The only hydrologic advantage to salvage logging would be accelerated regeneration of forest cover. One advantage to aspen treatments is the maintenance of vegetative diversity, which will lower the risk of large wildfires and associated watershed disturbance.

Mammoth Creek Watershed

The Proposed Action and Alternatives A and B would involve salvage/salvage logging and aspen treatments. One advantage to salvage/salvage logging and aspen treatments would be increased vegetative diversity, which would lower the risk of large wildfires and associated watershed disturbance. The only hydrologic advantage to salvage logging would be accelerated regeneration of forest cover.

Tommy Creek Watershed and Midway Creek Watershed

The Proposed Action and Alternative A would involve prescribed fire within this watershed. The advantage to these alternatives would be the reduction of fuels and continuity under controlled conditions, which would reduce the risk of large wildfires and associated watershed disturbance.

FISHERIES RESOURCE

DIRECT/INDIRECT EFFECTS: The Proposed Action for the Spruce Ecosystem Recovery Project is similar to and within the scope of the previous environmental analysis and implemented projects which have comparable affected environments. The environmental effects are similar to those described in the Tippets Valley Timber Harvest EIS. Sidney Valley Recovery Project EA, Rainbow Meadow Recovery Project EA, Pangunuk Lake Recovery Project EA, Blue Springs/Reeds Valley Recovery Project EA. Effects of Timber Harvest and Related Activities on Fish and Aquatic Macroinvertebrates (Robertson 1997), and Effects of Fire on Fish and Aquatic Macroinvertebrates (Robertson 1997).

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The primary potential for directly or indirectly impacting fish, aquatic macroinvertebrates, or aquatic habitats would be from the introduction of fine sediment to the streams. These impacts are well documented in the literature (Koshi 1996, Meehan and Swanson 1977, Everest et al. 1987). Fine sediment can change the species composition, diversity, and abundance of macroinvertebrates as well as suffocating trout eggs and fry. The tributaries which have potential to increase sediment to the streams are activities associated with timber harvest, including roads and skid trails, and prescribed fire. These effects are dependent, however, on their location and extent of treatment.

In order to minimize the impacts to the aquatic environment, Soil and Water Conservation Practices (SWCP's) will be implemented during road construction, timber harvest, and prescribed fire activities. These are discussed further in Chapter 4 - Hydrology. In addition Riparian ecosystems will be given special management consideration to protect riparian values, channel morphology, and water quality. During project implementation, an interdisciplinary
team will provide site specific prescriptions designed to protect and enhance riparian conditions and aquatic habitat. Where field reviews and site specific prescriptions are not completed, the following guidelines should be implemented:

Perennial, fish-bearing streams: No harvest, ground disturbance, or burning within 200 feet from the edge of riparian vegetation.

Perennial non-fish-bearing streams: No harvest, ground disturbance, or burning within 100 feet from the edge of riparian vegetation.

Intermittent and ephemeral channels: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or channel.

Ponds, lakes, swamps, and wetlands: No harvest, ground disturbance, or burning within 50 feet from the edge of riparian vegetation or seasonally saturated soil.

The proposed vegetation and fuel treatments, along with implementing SWCP’s and riparian prescriptions, would have minimal effects to Mammoth, Lower Castle, and Bunker Creek and their associated habitat and biota. The road closures and rehabilitations would result in less potential sediment reaching the streams once the roads stabilize and vegetation becomes established. The potential for sediment being transported to the streams would also be minimized by implementing the required SWCP’s and riparian prescriptions. Impacts to fisheries, fish habitat, recreational fishing opportunities, and aquatic macroinvertebrate communities would be minimal under Alternative A and would not substantially change from current conditions.

CUMULATIVE EFFECTS: Past and present activities which have occurred in the CEA include timber harvest, livestock grazing, dispersed recreation, and road construction. Implementing SWCP’s on past, present, and future timber sales and road construction activities, recovery of watershed restoration projects, and following proper use criteria/streambank disturbance criteria for the range allotments in the CEA, are designed to minimize or reduce the amount of sediment that is being transported to streams. Any effects from these activities to fish habitat or populations, aquatic macroinvertebrate communities or recreational fishing opportunities are expected to be minimal and short-term provided that required mitigation (SWCP’s, riparian prescriptions, proper livestock use) are adhered to.

NO ACTION

DIRECT/INDIRECT EFFECTS: The environmental effects of No Action for the Spruce Ecosystem Recovery Project are similar to those described in the environmental analysis documents listed previously. Although more trees would be expected to die, total cover in the watersheds should be similar to pre-treatment conditions as a result of needle cast, down logs and limbs, etc. If more trees die adjacent to stream channels as a result of No Action there will be an increase in the amount of large woody debris in the streams over time. This would increase stream productivity as well as increase habitat complexity for trout and other aquatic organisms. Fishing access along the stream may decrease depending on the amount of woody material that falls into or adjacent to the streams. Sediment levels in streams would be similar to what is existing at present.

CUMULATIVE EFFECTS: Livestock grazing, recreational use, roads, and private land use are the primary activities influencing aquatic communities in the CEA. Implementing proper use and streambank disturbance criteria for the range allotments should result in less erosion and sediment entering the streams than has occurred in the past. Implementing SWCP’s in timber sale activities within the CEA as well as implementing riparian prescriptions would not minimize the potential for sediment to enter the streams and affect downstream aquatic habitat.

ALTERNATIVE A

DIRECT/INDIRECT EFFECTS: The effects of Alternative A for the SERP is similar to and within the scope of previous environmental analyses and implemented projects which have comparable affected environments. The environmental effects are similar to those described in the Tippets Valley Timber Harvest EIS, Sidney Valley Recovery Project EA, Rainbow Meadow Recovery Project EA, Panpant Lake Recovery Project EA, Blue Springs/Reeds Valley Recovery Project EA, Effects of Timber Harvest and Related Activities on Fish and Aquatic Macroinvertebrates (Robertson 1997), and Effects of Fire on Fish and Aquatic Macroinvertebrates (Robertson 1997). Alternative A is similar to the Proposed Action with the exception that there would not be any prescribed
WILDLIFE RESOURCES

EFFECTS COMMON TO ALL ACTION ALTERNATIVES

The effects of timber harvest and prescribed burning are described in detail in "Effects of timber harvest on selected wildlife species" (Summers 1976a) and "Effects of prescribed fire on selected wildlife species" (Summers 1977b) and are incorporated here by reference. The following discussion describes the effects as they relate to the site specific actions of each alternative on the wildlife species discussed in this document. It is the intent of these discussions to change the habitat requirements that provide habitat to support other wildlife species as well.

The activities in the action alternatives would likely displace wildlife and may cause disturbance to nesting or reproductive success, depending upon the time of year, place and length of time the activity would take place. Where the mitigation measures to avoid disturbance to nesting birds is used (goshawks or other raptors) much of this potential disturbance could be avoided. Trees used by flickers for nesting may inadvertently be removed if they happen to be nesting in a tree cut down and therefore some flicker nests would be destroyed. This may be a risk, but the major mitigation measure is to prevent goshawk or other raptors nesting in these trees in order to keep them from killing the young birds. The mitigation measure is to provide nesting trees for goshawks where nesting is found in the nesting season for goshawk in their nesting areas would reduce this risk in those areas. The potential nesting losses are not expected to adversely affect the viability of the northern flicker because it is such a habitat generalist.

The effects of actions on wildlife is greatly influenced by the condition of the vegetation. In this section brief mention is made of how vegetation conditions and changes would affect wildlife. For a more detailed discussion of the vegetation refer to the Vegetation discussion.

Harvesting trees can break apart, fragment, forested landscapes. For some species, such as mule deer, this provides a good mixture of habitats and structure. For other species, fragmented habitat reduces "core" area where cover, food and water are found from the nest parasitism or where microclimates are more suitable. It can also reduce the use of forested patches below that which is needed to support specific species, rendering them unsuitable.

Another potential effect of fragmentation is access to new forested areas and/or more areas, by brown headed cowbirds. In areas grazed by cattle, this is especially prevalent. Female cowbirds lay their eggs (which can total up to 18 in one season or more in other birds, sometimes pushing out the host bird's eggs. The young cowbird is more aggressive and larger than the host baby and often pushes the host young out of the nest or obtains all of the food. This can have a detrimental effect on the host bird. Over 200 species of birds have been documented parasitized by brown-headed cowbirds (Elmhirst et al. 1988). This has proven to be a contributing cause of declines for several bird species, many of them non-typical migratory birds (Elmhirst et al. 1988).

Each of the action alternatives breaks up forested habitat. Large areas would remain comprised of aspen and willow. The major differences are: the case the alternatives harvesting the largest acreage of the SERP area alternatives fragment the habitat the most.

The DIS Zones would reduce understory vegetation and reduce down woody material below desired levels; for wildlife on 41 acres. These would not provide cover for elk, deer, or turkey. Since down wood would be at lower levels there would be less food for small mammals, birds, and insects requiring down wood. This would affect prey species for goshawks, flickers (mates Mexican spotted owls) and other wildlife species. An edge between opened DIS Zones and the adjacent forest would be created; subjecting the adjacent forest to conditions created from edge. Some wildlife species (e.g., squirrels) prefer the edge. Mammals such as foraging hares, and big game may alter their coat color and become more resistant to environment by sunlight. The DIS Zones would open up the forest canopy in linear strips, which would fragment the forest.

The mitigation measure to retain at least three stumps per acre of 14" dbh or larger is intended to provide snag habitat for feeding and roosting for many species. Harvesting around individual stumps may make them more valuable to windstorms and expose them to woodpeckers. Leaving snag habitat in clumps may alleviate this problem. Snag monitoring after timber sales has shown that after harvest the three stumps per acre requirement is not being met in some areas. Therefore the success of a mitigation measure is to retain at least three stumps per acre after activities in the area have been completed. In harvest units it is expected that stumps would not last as long as in unharvested areas due to potential windstorms and

Space Ecosystem Recovery Project

Cedar City Ranger District
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the gap between this insect infestation and the time when new snags are created in the future would be longer on the treatment areas.

Windthrow would be expected at an average rate between 1.5 and 1.3 percent per year (USDA 1974 page 124). On Boulder Top of the Dixie National Forest windthrow in a pure stand was 16 percent after about 30 years af-

McClendon (1980) suggested that simply leaving snags may not be sufficient for serious management of cavity nesting birds. He states that this approach concentrates on habitat components that result from ecological processes rather than the processes themselves and that the logical management objective is the perpetuation of a diversity of forest habitats, a mosaic pattern which includes old growth in each plant community type present for a particular area. Ideally, old forests of 20 to 50 ha (50-100 acres) should be connected with forest corridors of at least 100 meters (300 feet) wide (McClendon 1980). The size of old forest areas should correspond to the largest home range of species that inhabit the area (McClendon 1980). A similar approach is presented in "Forest Ecosystem Management: An Ecological, Economic, and Social Assessment" (FEMAT 1997), called "late-successional reserves" (pages IV-186-188). Therefore, blocks of unharvested areas would better meet the needs of cavity excavators. Diversity would also be better maintained with a variety of sizes of treatment and non-treatment blocks rather than the current large, non-fragmented treatment and non-treatment areas. Because a cause a determination has been made that potentially suitable nesting spotted owl habitat in Utah consists of steep-walled canyon complexes only (Rodriguez 1997).

The guidelines developed for protected and restricted areas for Mexican spotted owls nesting habitat have useful applications to wintering and dispersal habitats, and in spruce-fir and aspen communities (USDI 1995). These include managing for landscape diversity, mimicking natural disturbance patterns, incorporating natural variation in stand conditions, retaining special features such as snags and large trees (>18 inches dbh), and using fires as appropriate (USDI 1995). Proactive fuels management may also be important where appropriate. The burns planned in the Chicken Head area would be designed to mimic natural disturbance patterns. Therefore, the actions would be consistent with the recovery plan guidelines.

The guidelines in the recovery plan for all the management areas were put forth with the assumption that the habitat would consist of live trees. Because the SERP area consists of predominantly dead trees in the proposed treatment areas of spruce fir, a different approach is needed. This approach maintains corridors, even so they are dead trees. throughout the large area. The action alternatives were designed so that connectivity would be retained.

Activities conducted during the goshawk breeding season (March 1 through September 30) within a Nest Area or Post Fledging Family Area (PFA) can disturb nesting goshawks and cause nest failure, and possibly long term Nest abandonment. These activities include tree marking, road construction, logging, slash disposal and tree planting. With the mitigation measure to prevent disturbance to nesting goshawks implemented failure or abandonment would be avoided.

The treatments would also affect prey habitat for raptores and other carnivores. Ground disturbance activities would destroy small mammal nests and reduce cover for small mammals and birds. This may reduce them enough that a short time, until they move out of the area and seek cover in new depressions.

The composition of prey species would also change with the treatments. Larger openings (greater than four acres) would be expected to provide habitat for such species as band-tailed pigeon, mourning dove, and northern flicker (Reynolds et al. 1992, pg. 17). Larger openings would reduce habitat for prey species needing openings smaller than 4 acres such as blue grouse, chipmunks, and mantled squirrels (Reynolds et al. pg. 17).

Treatments in the Deer Creek area would increase forage for elk and deer but would reduce cover. This is an impor-

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tant consideration for elk use. Reduced cover would be adverse for elk calving and deer fawning. Because
deer tend to be more bonded to sites for fawning, the effort would be greater to deer. The increased forage would be beneficial for lactating elk and deer where cover is adjacent to it.
Treatments in the Hancock Peak Focus Area are planned to reduce tree density to prevent bark beetle infestation. If the above actions fail to reduce beetle activity, the harvest treatments would be the same as for the other harvest Focus Areas (sawlogs). This would result in less cover for big game and other wildlife and further reduce the suitability of the area to support nesting raptors.

The aspen stands planned for regeneration would likely be smaller or larger than those depicted on the maps presented in this document because some stands would be treated rather than stands. The acreage used in these analyses is the largest presented and mapped. Therefore, the reduction in aspen habitat would be somewhat less than presented here.

**PROPOSED ACTION**

**DIRECT/INDIRECT EFFECTS.** The following effects are described for wildlife species discussed under Chapter Three. Some species are grouped together because of similar habitat requirements and similar effects. For more information regarding the effects of timber harvest and prescribed burning on these species, refer to Effects of timber harvest on selected wildlife species (USDI 1997a) and Effects of prescribed burning on selected wildlife species (Summers, 1997b).

**Threatened and Endangered Species**

*Peregrine Falcon*

No activities would take place within one mile of the known occupied nesting cliffs in or near the SERP area; therefore, this General Protection Measure (USDI 1994) would be followed.

The principal areas where peregrines forage would not be directly affected with the Proposed Action, but areas immediately adjacent to these areas could cause some displacement due to noise, dust, and presence of people and machines.

Vegetation changes from the Proposed Action within ten miles of the nesting cliffs would affect forestsed habitats and not meadows, parklands, wetlands/riparian habitats or shrublands where peregrines forage. Forested edges would change due to timber harvest activities and burning. The meadows, parklands and riparian areas would be expected to continue to provide prey. In the long term forested areas would regress, naturally occurring mortality would occur and prey would be expected to be maintained.

In summary, peregrine falcons would be affected by activities of this alternative (foraging displacement) but there would be no effects to peregrine viability.

**Southwestern Willow Flycatcher**

The activities in the Proposed Action would not affect southwestern willow flycatchers or willow habitat directly.

The new forage created by harvest and burning may provide additional forage for brentrock away from riparian areas, particularly for cattle. This may allow willows to grow with greater structure in a few areas. This is not expected to be consequential or measurable because the nature of cattle is to prefer riparian areas for foraging wintering and nesting. The vegetative changes from harvest in the spruce would increase sediment (see Hydrology), which would increase risk of adverse effects in streams in poor condition. For further information, see the Riparian Habitat Conditions section below; the Hydrology discussion.

**Mexican Spotted Owl**

The Chicken Head prescribed burn and Steam Engine harvest activities are the activities that would take place closest to the documented occurrences. The Chicken Head burn would take place in the fall, which would be outside the nesting season for Mexican spotted owls. Because of concerns with smoke and the Town of Brian Head, Chicken Head would be burned when winds would blow the smoke to the north or northeast. This would blow smoke away from the Mexican spotted owl locations as well, however, would blow smoke towards a known goshawk nest. The harvest activities would occur during the summer months of growth into the fall. It is far enough away that mouse disturbance would not be likely, should there be a nesting pair of owls.

The Proposed Action was designed in order to maintain corridors for Mexican spotted owls to move from different cover types. Because of the bark beetle infestation and spruce mortality, some of these corridors are dead trees. However, there are also areas of aspen that have not been affected that also provide cover and connectivity between areas.

**Environmental Consequences**

Because of the spruce mortality in the SERP project area, some of the recovery plan guidelines cannot be met. Large diameter trees are the first hit and killed by spruce bark beetle, and are subsequently being removed to reduce risk of further infestation. Therefore, large diameter trees will become increasingly scarce. The prescribed burn would reduce five large trees in these areas. These areas would not be salvaged after the burn. Therefore, would provide abundant stumps and down wood for prey should they remain standing. The fires are intended to be stand replacing. Therefore, would be intense.

**Sensitivity Species**

**Three-Toed Woodpecker**

The effects of the Proposed Action on nesting and foraging habitat is summarized on Table 4.9. With the Proposed Action treatments would occur on 2.872 acres of aspen (primarily spruce) and 1.013 acres of aspen. The prescribed burn would occur on 2.974 acres of spruce and 921 acres of aspen. An additional 41 acres would be treated in DFS. This comprises approximately 2% of the forsyre habitat in the project area and 24% of the aspen on National Forest System land.

Table 4.9. Summary of Effects on Nesting and Foraging Habitat for the Proposed Action.

<table>
<thead>
<tr>
<th>TREATMENT TYPE</th>
<th>COVER TYPE</th>
<th>ACRES</th>
<th>NESTING HABITAT</th>
<th>FORAGING HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salvage</td>
<td>Spruce-fir</td>
<td>1.211</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
<tr>
<td>Sanitation</td>
<td>Spruce-fir</td>
<td>1.661</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
<tr>
<td>Prescribed burn</td>
<td>Spruce-fir</td>
<td>2.974</td>
<td>Reduce</td>
<td>Short term improve</td>
</tr>
<tr>
<td>Prescribed burn</td>
<td>Aspen</td>
<td>921</td>
<td>Reduce</td>
<td>Short term improve</td>
</tr>
<tr>
<td>Clone treatment</td>
<td>Aspen</td>
<td>1.013</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
<tr>
<td>DFS zones</td>
<td>Spruce-fir</td>
<td>41</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
</tbody>
</table>

The burned spruce areas would have abundant stumps for 10 to 20 years or more until they fall or are blown down. Some stumps would probably remain longer in well-protected areas. It is assumed that the salvage would be in locations with abundant dead trees, except in the Hancock area where the attempt will be to reduce density to prevent spruce mortality (unless mortality results from infestation regardless of treatment). Therefore, stumps densities will be reduced in these areas.

The areas to be salvaged have a high percentage of dead trees. The Hancock Peak Focus Area would be such that canopy would be less than desired for suitable nesting habitat. The burned areas would also not be expected to provide nesting habitat (but would provide good foraging habitat in the short term). Therefore, nesting habitat would be reduced by 1.934 acres in the aspen and 5.846 in the spruce habitat types. These open stands would not provide suitable nesting habitat for three-toed woodpecker. Foraging could still occur in these stands if not far from suitable nesting habitat (aspen, for example).

With the Proposed Action there would remain nine areas between 148 and 505 acres of spruce-fir habitat. Many of these areas are adjacent to aspen stands which would increase their size for maintaining three-toed woodpecker habitat. Cedar Ridge is the only patch where there is no adjacent aspen.

In the Roadless Focus area four forested blocks ranging from 148 to 334 acres of spruce-fir would remain after the burn. Radar Ridge would maintain three areas of 255, 366 and 318 acres each of spruce-fir. The Hancock Peak Burn would reduce Spruce-fir areas would become fragmented and not provide any areas over 100 acres of spruce-fir. One area of 202 acres would remain in the Lower State area. Blowhard would maintain 505 acres of spruce-fir. In Cedar Breaks, National Monuments a stronger patch of about 130 acres would remain. With this alternative, one area would remain treatment (recommended 525 acres of untreated areas for three-toed woodpeckers). (Goggans et al. 1987) but all nine areas would meet the timber size determined for three-toed woodpeckers for Colorado (Baldwin 1965, Koplin 1967). This alternative would fragment habitat the most of all the alternatives and would provide the least amount of large harvested blocks.

Spruce Ecosystem Recovery Project 4-50
Northern Goshawk
The treatment area was within five goshawk territory Foraging Areas. Activities in the Proposed Action would displace foraging goshawks in the short term. This displacement would be temporary, during 1997 through 1999, and would vary depending upon what Focus Area is treated during different periods of time. It would be possible that all Focus Areas would have activity in them at the same time with either cutting, burning, slash disposal, planting or site preparation. The greater the number of activities operating at the same time or during the same nesting season, the greater the risk of affecting goshawks adversely.

Depending upon the availability of prey near nests and other activities going on in the area, displacement may cause more energy expenditure to obtain prey for young. During a year with low prey abundance, this could affect nest productivity. In years with abundant prey, there may be no effect on productivity.

The mitigation measure regarding timing restrictions in goshawk Nest Areas and PFA's in Chapter 2 (Number 18) prescribes a process to determine if a timing restriction would be implemented. If a timing restriction is not implemented, there may be a high risk of nest failure and territory abandonment. The more goshawk Nest Areas and PFA's - where disturbances are allowed in the nesting season, and the greater the acreages where PFA's and Foraging Areas become less suitable, or unsuitable with harvest or beetle infestation, the higher the risk of adverse effects to population viability on the District.

Table 4-10 shows the estimated changes of VSS in the aspen cover type, reflecting the amount of area changed from VSS 4.5 and 6 to VSS 1. These data are based on the assumption that the clone treatments would occur in the VSS 4.5 and 6 standard that these treatment areas would become VSS 1. In the aspen cover type, the Proposed Action would increase area in VSS 1 and 2, which is desirable for proper functioning and providing long term habitat. In the short term, however, existing nesting habitat would be reduced.

Table 4-10. Percent of the SERP Area in Each VSS of Aspen Cover Type with the Proposed Action.

<table>
<thead>
<tr>
<th>COVER TYPE</th>
<th>VSS 1, 2 (desired)</th>
<th>VSS 3, 4, 5 (desired)</th>
<th>VSS 6 (desired)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspen</td>
<td>22%</td>
<td>58%</td>
<td>2%</td>
</tr>
<tr>
<td>Existing condition</td>
<td>3%</td>
<td>95%</td>
<td>2%</td>
</tr>
</tbody>
</table>

In the cover types, the spruce beetle infestation and mortality is causing increased area to be classes as VSS 1 even though vertical structure of dead trees still exists. Because the amount of dead trees are so rapidly changing, it is difficult to estimate accurately. VSS 4, 5, and 6, based on live tree data, are decreasing below desired amounts for goshawk habitat. Both nesting and foraging because of the spruce mortality. VSS 1 is increasing above desired amounts. It is estimated that VSS 1 would increase to at least 43% from the vegetation management treatments, but would be higher with changes from the spruce mortality. Considering only the vegetation management treatments, VSS 4, 5, and 6 would decrease to approximately 36%. With the spruce mortality this would drop further.

It is important to note that there are many stands in the project area with dead trees which are classified as VSS 1 by live tree data, that may still be suitable, even though not necessarily desired, as nest trees and Nest Areas. Dead stand harvested do not meet nest stand characteristics. In other words, goshawks may nest in dead trees and dead "nest Areas", but would not likely nest in areas that have been salvaged or sanitation treatments that reduce tree diameter and open stands with little canopy cover.

An additional method to estimate acreage with suitable diameter trees to provide nesting habitat is by using stand data on tree size classes by cover type shown on Table 4-11. This data also indicate that nest sites are a limiting factor to goshawk nesting habitat in the future the large trees present, providing they do not succumb to the bark beetle.

Guidelines for goshawk management (Reynolds 1982) include maximum opening sizes as well as VSS. For spruce-fir habitats the maximum size recommended is one acre in both the Post-Felling Family Area (PFA) and Foraging Area. Salvage operation would create openings larger than one acre because there is much mortality in the spruce and spruce-fir habitats. Therefore, PFA's and foraging areas would become less suitable and perhaps unsuitable with salvage. Of the five Foraging Areas, two would be affected the most, one with the Chicken Head burn and the other with the Lower/Lake and Banker harvest and aspen clone treatments. PFA's of these same nests would also be affected with Chicken Head burn and the Lower/Lake activities.

Without harvest, the dead trees would provide more suitable foraging and PFA habitat than harvest for about 20 to 40 years. Trees would gradually (or many at one time with a large wind) fall down creating openings larger than one acre, also creating less suitable or eventually unsuitable habitat also. With harvest, regeneration would occur about 20 years ahead of areas without harvest. Therefore, in the short term, salvage would not maintain PFA's or Foraging Areas as well as no harvest, and in the long term, salvage would move stands toward replacement habitat faster than no harvest by about 20 years.

Spotted And Western Big-Eared Bat
The limiting factor for these bats is habitat for roosting, hibernation and reproduction. Caves and mines would not be affected with the Proposed Action, however, stages in large diameter trees (used for roosting) would be reduced.

Bats may use the project area for foraging, but they are nocturnal and project activities will take place during the day. Therefore, there would be no direct effects from this alternative (including metal and follow-up harvest or cutting, road construction, re-construction or closing, planting, and other associated activities).

There would be an increase in forested edge areas used for foraging by bats as a result of created openings. There would be a decrease in total numbers of flying insects (beetles particularly) because of loss of mature, bug infested trees in the project area. The high reproductive rate of insects would ensure that this change would only be temporary.

These would be a decrease in flying insects associated with late successional forests, and an increase in insects associated with early successional forests. Neither of these effects would change populations of bats since this is one of many foraging areas within a two mile radius of the potential roost sites. Thus, no long term effects are anticipated with the Proposed Action.

Flammulated Owl
Potential nesting habitat would decrease in the spruce-fir and aspen cover types with the Proposed Action due to the decrease of the number of acres with large diameter trees, or VSS 5 and 6. This effect in the spruce-fir is not expected to be consequential to flammulated owls since their primary habitat is ponderosa pine and the project area has none of this habitat type. They have been documented nesting on other cover types, such as aspen, but not in spruce-fir (Reynolds and Kinzel 1984).

Aspen treatments would reduce potential nest sites in the short term, but would maintain this habitat in the long term. If the aspen stands are not treated, they risk becoming further encroached by conifers and losing the close reversibility.

<table>
<thead>
<tr>
<th>COVER TYPE</th>
<th>SMALL (1' - 4')</th>
<th>MEDIUM (4' - 8')</th>
<th>LARGE (8' - 16')</th>
<th>VERY LARGE (16' or greater)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspen</td>
<td>2167</td>
<td>2596</td>
<td>4418</td>
<td>0</td>
</tr>
<tr>
<td>Conifer</td>
<td>6194</td>
<td>4540</td>
<td>17299</td>
<td>363</td>
</tr>
<tr>
<td>Percent</td>
<td>22%</td>
<td>19%</td>
<td>58%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Table 4-11. Estimated Acres of Tree Size Classes by Cover Type with the Proposed Action.
increased foraging habitat. In the long term, seedlings and saplings would become larger trees, shading out the grasses and forbs, and providing more effective habitat for grazers.

Down wood would provide perches for lookout sites and scattered groups of large trees would provide feeding sites throughout the project area. The result should be sufficient suitable foraging habitat to maintain potential turkey needs and use in the project area.

Removal of large diameter trees would reduce roosting sites for turkeys in the treated areas.

Treatment in the aspen stands would also increase grasses and forbs for foraging turkeys. Increased insects would be expected with this change in vegetation, which would provide foraging habitat for pouls.

Northern Flicker

In the short term and long term aspen stands would be used by flickers for nesting and foraging as well as the spruce-fir stands within the project area. Non-forested areas would also be used for foraging. Thus, there would sufficient habitat retained to maintain flicker populations in the project area in the long term.

The 1934 acres of aspen treated with this alternative would reduce nesting habitat for flickers in those areas until such time as new snags are created. This is estimated to be approximately 100 years.

With the mitigation measure to leave three snags per acre greater than 18" dbh sufficient snags and down woody material would be provided for most sites and insects for foraging. Ground disturbance by tractor logging and skid trails and temporary roads would destroy ant colonies; however, ant numbers are not likely limiting in the project area and designated skid trails would minimize the disturbed areas. There would be an increase in numbers of openings for foraging, with a concomitant increase in shrub and forb and grass insects. Thus, this action would reduce nesting habitat but maintain foraging habitat. Compared to the other alternatives the Proposed Action would reduce nesting habitat the most.

Other Species Of Concern

Blue Grouse

Timber harvest and other associated activities (road construction and reconstruction, planting, road closures) would not change the habitat described below. The forest cover type was determined to be between 40% and 60% mature and closed for most of the project area. Skid trails and temporary roads would destroy or alter the habitat. The project area was designated in the project area and designated skid trails would minimize the disturbed areas. There would be an increase in numbers of openings for foraging, with a concomitant increase in shrub and forb and grass insects. Thus, this action would reduce nesting habitat but maintain foraging habitat. Compared to the other alternatives the Proposed Action would reduce nesting habitat the most.

Northern Flying Squirrel

Timber harvest or burning trees that contain flying squirrels would be inadvertent disturbance, winter or summer. If young are present in the tree they would likely perish. In winter, extra energy would be expended to find a new roost site. During this period they would be vulnerable to predation.

Timber harvest and burning would reduce habitat for flying squirrels. The primary effect would be the loss of snags and large diameter trees that would provide future snags. This would occur in both aspen and spruce-fir for plant communities. The Proposed Action would have the greatest potential effect on this component due to the large acreage treated.

Bats

Timber harvest activities would reduce numbers of bats, which would reduce availability of roost sites associated with trees (taller trees and loose or excitatory bark). Reduction of hollow trees would reduce roosts for the Calaveras myotis, long-eared myotis, and Brazilian tree-sailed bat. Reduced numbers of trees with loose bark would reduce roosts for California myotis, western small-footed bat, long-eared myotis, and long legged myotis.

Changes in forested canopy would affect foraging habitats for Allen’s big-eared bats. Quantities of insects as food for bats is not anticipated to change, however, composition may change with additions of grass, forbs and shrubs. Increases in grasses, forbs and shrubs would be expected to increase insects, on which some bats feed. Increased low brush would increase foraging habitat for western small-footed myotis.
CUMULATIVE EFFECTS: Harvest has already occurred on 8,150 acres or 23% of the forested area in the planning area within the last 20-30 years (see Appendix 16G). When combined with 60 years of harvest in the DPS zone, and burning with this alternative, 30% of the SERP area and 46% of the forested acreage in the CEA would be treated on National Forest land.

Future foreseeable timber harvest activities in the CEA, with potential effects to wildlife, would be additional harvests in the SERP area, the Ponderosa Pine Recovery Project (PRP) and the Mixed Conifer Recovery Project (MCRP). These will have separate analyses. It should be noted that larger treatments in the spruce-fir habitats in the same watersheds may likely reduce the options for treatments of the same nature in the alternative SERP harvests. PRP and MCRP areas because of the increased difficulty meeting wildlife requirements, standards and guidelines that come with timber harvest and burning treatments.

During the watershed assessment process, risk of potential adverse effects were estimated based on the existing condition of habitat components needed by the species analyzed (i.e., except blue grouse and northern flying squirrels). The results of these analyses are shown on Table 3-4 by each watershed. For further information, refer to the watershed assessment report for each watershed in the Project file (Exhibit 36).

The risk rating assessed for cumulative effects to peregrine falcons would not likely change with the Proposed Action. The risk rating for Ponderosa and Mixed Conifer watersheds was based on existing potential disturbances within one mile of the nearest nesting cliff. Foraging habitat would not be directly affected with the proposed treatments, but the adjacent forested edges would be. Some habitat changes could cause peregrines to change foraging habits for the time period during activities (1997 through 1999). Although this is concerning, when combined with other acreage being treated in the SERP area, it is not likely to adversely affect peregrines because the activities would not likely occur all at once.

Cumulative effects of the Proposed Action on southwestern willow flycatcher are not likely. The proposed treatments are not to southwest or willow habitat. The possible effect of livestock grazing more in newly created forage areas from the treatments within and outside the SERP area is not anticipated to be consequential.

Mexican spotted owl habitat was rated moderate in Parowan watershed because of the extensive habitat modification with urbanization, ski resort facilities, spruce mortality and logging. The Chicken Head prescribed burn and Steam engine salvage would add to this effect. Large diameter trees would be decreased further and cut near sources would also be reduced. The Steam engine salvage was designed to maintain a connected cover of trees (even though dead) for Mexican spotted owl and other wildlife. This strip connects to those left in the Steam Valley Timber Sale area. Therefore, there would be cumulative effects to spotted owl habitat, but these are not expected to affect spotted owl viability.

INFORMATION PRIOR

Results of 1997 wildlife field surveys are incorporated into the biological assessment for threatened, endangered and proposed species and in the biological evaluation for sensitive species. These data do not substantially change the environmental issues and values described in this chapter for wildlife species and habitats.

The Draft EIS did not include discussions regarding consequences of the alternatives to bald eagle. That discussion can be found in the biological assessment and is briefly described here.

Bald Eagle - Since no bald eagle nests occur within the Dixie National Forest, there would be no effects of any of the action alternatives to nesting. Since no bald eagle nests are known within the SERP area, the harvest activities - did not disturb nesting. Nests would be maintained in the project area or locations were no harvest is planned, as well as within the treatment areas in the action alternatives, and therefore, would be available for potential nest sites. "Nests are antipated to potential prey with any of the action alternatives for the No Action Alternative. Alternative actions would not be affected and perches would be maintained.
Activities in the Lower State and Bunker focus areas, combined with other past and present activities, would cause a significant modification in one of the five goshawk territories. This territory has been one of the most productive of those territories in the CEA. It is possible that territory abandonment would occur in the future due to space mortality even without harvest. The Proposed Action would cause this risk of abandonment to be incurred somewhat more certainly, than if no activities were planned.

Lack of stages also contributed to three-toed woodpecker's moderate rating. Reduced options for providing large tracts of unharvested areas for three-toed woodpeckers also contributed to this rating. Although there would be large tracts left for these woodpeckers, each harvest reduces options for providing this habitat. After the spruce beetle infestation subsides, three-toed woodpecker populations would be expected to decline. Three-toed woodpeckers are opportunistic feeders and have been observed in mixed conifer and ponderosa pine stands. These areas may be important in providing habitat during the period of time needed to grow a new spruce forest. Future harvest treatments in ponderosa pine and mixed conifer habitats should consider this potential interaction since reducing these options further could lead to adverse cumulative effects.

Retaining snags in the SERP area, therefore, is very important. Leaving more than the average three per acre equal to or greater than 18" dbh will likely be necessary to maintain three per acre after all activities have been completed because of hazard tree removal during logging and illegal woodcutting. Chunks of snags, which may remain standing longer than individual trees, placed away from easy access from woodcutters would stand a greater chance of longevity.

Habitat conditions for elk and deer in the cumulative effects area is low for cumulative effects except Parowan. Parowan has high urbanization, road density, and the ski resort area.

NO ACTION ALTERNATIVE

DIRECT/INDIRECT EFFECTS. With the No Action Alternative, the dead spruce stands would remain; no harvest would occur. No aspen would be regenerated and no attempt to test a harvest regime against spruce bark beetle would occur. The large amounts of snags and down logs would increase habitat for small mammals and associated species. Based on studies conducted in other spruce forests involving bark beetle infestation and mortality, the majority of the snags would remain standing for 20 to 40 years before falling down (USDA 1974).

Windthrow would be expected at an average rate between 1.5 and 1.3 percent per year (USDA 1974 page 12). On Bunker-Tup in the Dixie National Forest, windthrown in a pure spruce stand was 16 percent after about 50 years after the beetle infestation (Mielke 1950 in USDA 1974).

After that time, large amounts of dead wood would provide increased habitat for small mammals and insects but may make capture of small mammals by predators more difficult because of the abundant wood for cover. Movement through this dead wood by larger animals may be more difficult in some areas as the snags fall and pile up (USDA 1974). Elk and deer would likely travel in locations that avoid these areas. Fallen trees that touch the ground would decay in about five years on the part touching the ground and longer for parts of the tree not touching the ground (USDA 1974 page 12).

Abundant snags and down logs in the spruce for stands would increase the risk of fire. Although beetle-killed spruce are potential lightning rods and the massive number of dead trees would create a large fuel buildup, the fire hazard would not be substantial because summer lightning is usually accompanied by rain (USDA 1974). The importance of fire hazard in spruce for is less than on other timber types (USDA 1974 page 13).

Fragmentation of dead stands would be minimized with the No Action Alternative. More variety of block size would be retained in the short term (20-40 years).

Initially, summer forage for deer and elk would improve in dead stands. Due to more light reaching the forest floor, this improvement would continue until the site is fully occupied and forage would not decrease in quantity until new trees begin competing with this new vegetation and are shed out (USDA 1974).

The aspen stands would continue to become encroached by conifers until the clone is no longer able to regenerate and die out. Species that depend on this habitat would lose this habitat irreversibly in those site specific locations.
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Aspen stands would not be regenerated and the clone would eventually be lost. Habitat to support goshawk prey species "suitable and is covered by Flying squirrels would be required.

"Spotted and Western Big-eared Bat"

The limiting factor for these bats is habitat for roosting, hibernation and reproduction. Caves and mines would not be affected with the No Action Alternative. Snags and large diameter trees (used for roosting) would be maintained in large amounts.

There would be no direct effects from this alternative on these bats. Eventually (after about 20-40 years) forested edges would be created naturally as dead spruce fall. Eventually, there would be a decrease in flying insects associated with late successional forest, and an increase in insects associated with early successional forests. Neither of these effects would change population levels since this is one of many foraging areas within a two mile radius of the potential roost sites. Thus, no long term effects are anticipated with the No Action Alternative.

"Flammulated Owl"

No-take habitat would not decrease with the No Action in the short term. In the long term large diameter trees would be lost as dead spruce fall while a new forest regenerates. This is not expected to be a factor in effects to flammulated owls since these primary habitat is ponderosa pine and the project area has none of this habitat type.

Without treatments in the aspen stands that contain heavy conifer encroachment, the aspen clones would be irreversibly lost. This would reduce potential nesting habitat in the long term for flammulated owls.

"Management Indicator Species"

The northern goshawk, which is both a MIS and Sensitive Species, is discussed under the Sensitive Species heading.

"Elk and Deer"

The existing cover/large site would remain the same in the short term. As the dead trees fall (after about 20-40 years), cover would reduce until new aspen trees are regenerated. Dead trees do provide cover to the edges. The opportunity to provide new cover and forage areas with aspen would be lost with this alternative.

In pure dead spruce stands there would be little cover and it would be difficult to meet Standards and Guidelines specified in the Forest Plan along the edges of roads, streams and openings.

Road density would remain at 2.45 miles per square mile, over Standards and Guidelines.

"Merriam's Turkey"

Down wood would provide perches for lookout sites and scattered groups of large trees would provide logging sites throughout the project area. The result should be sufficient suitable foraging habitat to maintain potential turkey density and use in the project area.

Roosting sites for turkeys would be maintained with the No Action Alternative until the dead trees eventually fall.

Aspen stands containing heavy conifer encroachment would continue to provide cover, but would eventually be lost to conifers. The diversity provided by this cover type would be lost.

"Northern Flicker"

The aspen stands in the project area that are incurring encroachment and "old age" would continue to deteriorate and be eventually the clone would be lost to conifer habitat. This would reduce nesting habitat for flickers in the long term on aspen habitat.

In the spruce stands, abundant snags and down wood would provide abundant potential nest sites and food for flickers.

Other Species Of Concern

"Blue Grouse"

Large diameter trees used for roosting would be maintained in the short term with this alternative, until they eventually fall. Areas where this would have the greatest effect to blue grouse would be along edges. As they fall.

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openings would eventually be created. With less cover in spruce stands, blue grouse may be more exposed and vulnerable to predation.

"Northern Flying Squirrel"

Snags used by flying squirrels would be abundant with the No Action Alternative. Areas with undisturbed habitat would be provided. Aspen stands containing heavy conifer encroachment would be lost in the long term without treatments.

CUMULATIVE EFFECTS: Harvest has already occurred on 8150 acres or 23% of the forested area in the planning area within the last 20 years. The No Action Alternative would not add to this acreage.

Future forecasts timber harvest activities in the CEA with potential effects to wildlife would be PERP and MERP. These forecasts would have separate analyses. Leaving large areas uncutted in the spruce-fir habitats in the same watersheds will provide more options for treatments of the same nature in the PERP and MERP areas.

During the watershed assessment process, risk of potential adverse effects were estimated based on the existing condition of habitat components needed by all the species analyzed above except blue grouse and northern flying squirrel. The resource use these assessments are shown in Table 4-14 by each was large. For further information, refer to the watershed assessment for each watershed in the Project File (Exhibit 36).

With the No Action Alternative, the risks would remain the same in the short term. In the long term, loss of aspen habitat would increase risk of adverse effects for species that depend on aspen, or that are an important component. These species would include goshawks, flickers, snappers, three-toed woodpeckers, and many other species of birds, elk and deer.

The risk of cumulative effects to northern goshawk is moderate to high, particularly in the Panguitch Lake and Upper Mammoth watersheds due to reduced nests sites, snags and down logs. Large diameter trees and snags were also reasons for moderate and high ratings for spotted and western big-eared bats, flammulated owls and northern flickers. The ponderosa pine habitats in the watersheds have been previously harvested and consist mainly of young forest conditions. Very few large diameter trees are present. The No Action Alternative would not be cumulative with these conditions; they would remain the same.

Lack of snags also contributed to three-toed woodpecker's moderate rating. Reduced options for providing large tracts of unharvested areas for three-toed woodpeckers also contributed to this rating. Although there would be large tracts left for these woodpeckers, each harvest reduces options for providing this habitat. After the spruce beetle infestation subsides, three-toed woodpecker populations would be expected to decline. Three-toed woodpeckers are opportunistic feeders and have been observed in mixed conifer and ponderosa pine stands. These areas may be important in providing habitat during the period of time needed to grow a new spruce forest. Future harvest treatments in ponderosa pine and mixed conifer habitats should consider this potential interaction since reducing these options further could lead to adverse cumulative effects.

Retaining snags in the SERP area, therefore, is extremely important. Leaving more than the average three per acre equal to or greater than 8' dbh would likely be necessary to maintain three per acre; after all activities have been completed because of hazard tree removal during logging and illegal woodcutting. Clumps of snags, which may remain standing longer than individual trees, placed away from easy access from woodcutters would stand a greater chance of longevity.

Lack of snags also contributed to moderate rating of high ratings for three-toed woodpeckers, flickers, bats, and goshawks. There would be large tracts left for these woodpeckers. The No Action Alternative would provide abundant snags in the spruce-fir zone for a longer period of time than if harvested. Mixed conifer and ponderosa pine stands are next in line for analysis for harvest. These areas may be important in providing habitat during the period of time needed to grow a new spruce forest. Future harvest treatments in ponderosa pine and mixed conifer habitats should consider this potential interaction since reducing these options further could lead to adverse cumulative effects. Retaining snags in the SERP area, therefore, is extremely important in order to avoid adverse cumulative effects.

Habitat conditions for elk and deer in the cumulative effects area is low for cumulative effects except Parowan. Parowan has high urbanization, road density, and the ski resort area.

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ALTERNATIVE A AND B COMPARED TO THE PROPOSED ACTION

DIRECT INDIRECT EFFECTS:

Alternative A is much like the Proposed Action except for the Spruces Focus Area would not be harvested. The Chicken Head burn would not take place and the Lower/Rocky State aspen treatment would only be 67 acres rather than 240 acres. In addition, 240 acres would leave more areas undisturbed with dead spruce, which would regenerate less aspen, and would leave more area with potential for stand-replacing fire (on the Chicken Head Focus Area).

Alternative B is much like the Proposed Action except for the Roadless Focus Area would not be burned. In general, this would leave more areas undisturbed with spruce, which would regenerate less aspen, and would leave more area with potential for stand-replacing fire (on the Roadless Focus Area). The Roadless area would not be burned unless inflicted by bark beetle and subsequent mortality causes.

The Proposed Action would treat the largest total acreage with 1934 acres of aspen and 5846 acres of spruce-fir. Alternative A would treat the least amount of aspen and Alternative B would treat the least amount of spruce-fir. With the Proposed Action the smallest blocks of unharvested areas would remain, while Alternative B would leave the most acreage in blocks (fragmentation). More acreage harvested would benefit species such as deer and elk due to more forage created, whereas, would reduce important habitat components for species such as goshawks and three-toed woodpeckers.

There would be no measurable difference between the effects described in the Proposed Action and Alternative A or B for southwestern willow flycatcher because no potentially suitable habitat would be affected.

Trees equal or greater than 20’ dbh, needed for northern goshawk nesting habitat, turkey or oak trees and future large diameter trees for flying squirrels, are below desired amounts in the SERP area and are continuing to decrease due to the spruce mortality from the beetle infestation and subsequent timber harvests. A comparison of the present area with tree size classes is shown on Table 4.15. A large proportion of the forested area consists of trees 9.0 inches to 15.0 inches. Proximal trees are succumbing to the beetle infestation and subsequent timber harvests. A comparison of the present area with tree size classes is shown on Table 4.15. A large proportion of the forested area consists of trees 9.0 inches to 15.0 inches. Providing these do not succumb to the beetle infestation, there would become larger trees in another 20 to 50 years. If the beetle infestation progresses as it has in the last five years, most of these trees will die and the shortage of large diameter trees would be extended for 100 to 200 years. The Proposed Action would reduce acreage with large diameter trees the most because of the larger amount of area proposed for harvest. Alternative A harvests less, therefore, would maintain more area with large diameter trees in the short term. Alternative B would provide the largest acreage, especially if the Roadless does not need to be burned.

Table 4.15. Percent of Surveyed Acres with Tree Diameter Stubs by Alternative.

| ALTERNATIVE | SMALL (1” - 4” | MEDIUM (4” - 8” | LARGE (8” - 15” | VERY LARGE (16” plus)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>5%</td>
<td>15%</td>
<td>52%</td>
<td>18%</td>
</tr>
<tr>
<td>Proposed Action</td>
<td>22%</td>
<td>19%</td>
<td>56%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Alternative A</td>
<td>19%</td>
<td>19%</td>
<td>56%</td>
<td>4%</td>
</tr>
<tr>
<td>Alternative B</td>
<td>15%</td>
<td>19%</td>
<td>59%</td>
<td>7%</td>
</tr>
</tbody>
</table>

A summary of a comparison of VSS by alternative is shown on Tables 4.16 and 4.17. Table 16 is an estimate of the change in VSS in the comfort cover type from vegetation management activities only, and does not consider spruce changes occurring presently from spruce mortality. Therefore, the actual percent in VSS 1 would be higher and VSS 4.5 and 6 would be lower than shown, but the structure from dead trees would still remain in stands undisturbed but considered VSS 1 by live tree data. The Proposed Action would leave fewer VSS 1 areas where vertical structure from dead trees is still present. In the long term the Proposed Action would regenerate the most acreage faster than the other alternatives, and Alternative B would regenerate the least.

The increase in VSS 1 through harvest, close treatment and burns would have a beneficial effect for elk and deer, as shown by Table 4.18. Whereas this would reduce nesting habitat and create larger openings than desired for the northern goshawk, flat-tailed owl and flying squirrel. Trees with diameters suitable for nesting would be reduced by all action alternatives, with the Proposed Action reducing this habitat the most in the short term. Alternative B retains the most acreage in the short term with very large trees while allowing treatments.

Table 4.16. Comparison of Conifer VSS estimates from only vegetation treatments (not beetle mortality), by Alternative.

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>VSS 1</th>
<th>VSS 2</th>
<th>VSS 3</th>
<th>VSS 4, 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>32%</td>
<td>4%</td>
<td>11%</td>
<td>53%</td>
</tr>
<tr>
<td>Proposed Action</td>
<td>43%</td>
<td>4%</td>
<td>15%</td>
<td>38%</td>
</tr>
<tr>
<td>Alternative A</td>
<td>49%</td>
<td>4%</td>
<td>15%</td>
<td>41%</td>
</tr>
<tr>
<td>Alternative B</td>
<td>37%</td>
<td>4%</td>
<td>15%</td>
<td>44%</td>
</tr>
<tr>
<td>Desired</td>
<td>10%</td>
<td>10%</td>
<td>20%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Table 4.17. Comparison of Aspen VSS by Alternative.

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>VSS 1, 2</th>
<th>VSS 4, 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Proposed Action</td>
<td>24%</td>
<td>1%</td>
</tr>
<tr>
<td>Alternative A</td>
<td>18%</td>
<td>1%</td>
</tr>
<tr>
<td>Alternative B</td>
<td>14%</td>
<td>1%</td>
</tr>
<tr>
<td>Desired</td>
<td>40%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Increasing acres in VSS 1 increases grass, forbs and shrubs. This would benefit northern flickers, elk, deer, turkeys, blue grouse northern flying squirrel, fumigated owls and bats, depending upon the sizes of the openings. Larger openings would benefit northern flickers, elk and deer, whereas, the rest of the species above would benefit from smaller openings (four acres or less). All of the action alternatives would create openings larger than four acres; the Proposed Action would create the most large openings. Bats, who forage along edges, may not be affected by opening size, and may benefit from increased insects supported by the increased grasses, forbs and shrubs. However, snag reduction from harvest would reduce potential but roosting habitat.

VSS 2, seedlings and saplings, is low in the SERP area. This would not change in the short term from any of the alternatives. The action alternatives would create more VSS 1 in aspen which would become VSS 2 in the long term. Because of the spruce mortality, it is expected that acreage in the VSS 1 will continue to increase until the infestation dies down. In the long term this would create more VSS 2.5em 3 etc.

Results of the watershed analysis showed that most of the conifer cover types had amounts of VSS 4.5 and 6 below desired amounts. This was especially apparent in the ponderosa pine in the Pangan Lake Mammoth and Upper Assay watershed and in the spruce for in the Patowman, Pangan Lake, and Upper Mammoth watersheds. The mixed conifer areas provided the greatest amount of VSS 4.5 and 6, particularly in the Pangan Lake and Upper Assay watersheds.

The importance of discussing the percent of VSS 1, 5 and 6 in the watersheds is apparent when discussing the limiting factor for the northern goshawk, fumigated owl, Mexican spotted owl, bats and other species needing large diameter trees (and future large diameter snags). The spruce mortality and harvest treats are reducing the standing large tree component used by these species. Fast harvest treatments, particularly in the ponderosa pine, have reduced this component also such that over the landscape it is a considerable limiting factor. Because standing dead trees have more value to the species needing large diameter trees than few trees (as with harvest), it is important to maintain blocks of unharvested areas to help carry these species through until the landscape has a greater amount of these VSS's.
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This same principle is true for three-toed woodpeckers. The recommended size of leaf areas for three-toed woodpeckers is 250 acres (Osgood et al. 1987, Osgood 1997 pers. comm.). Alternative B leaves the largest unharvested block, with no fragmentation, to help provide this habitat. The Proposed Action leaves the least amount of unharvested blocks, in both size and number.

Percent cover retained for elk and deer would still be within desired amounts with all action alternatives. The watered-out, scaled holding cover to be within desired amounts. The action alternatives would result in these amounts still being within the desired condition. Road density would remain above Forest Plan standards and guidelines with all alternatives. The only watershed with road access above standards and guidelines is the Upper Asay. The action alternatives construct and close roads in the other watersheds. Thus, all the alternatives would not change the existing condition of 2.4 miles per square mile in the Upper Asay watershed.

Table 4-19. Comparison of Elk Cover and Road Density by Alternative.

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>PERCENT COVER</th>
<th>ROAD DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>84%</td>
<td>2.43 min sq mi</td>
</tr>
<tr>
<td>Proposed Action</td>
<td>58%</td>
<td>2.49 then 2.33</td>
</tr>
<tr>
<td>Alternative A</td>
<td>62%</td>
<td>2.44 then 2.33</td>
</tr>
<tr>
<td>Alternative B</td>
<td>64%</td>
<td>2.49 then 2.33</td>
</tr>
<tr>
<td>Desired</td>
<td>40% to 44%</td>
<td>2.0 or less</td>
</tr>
</tbody>
</table>

Griff's rock and tallus habitats would not be affected differently by any of the alternatives. Therefore, pergine falcon nesting and foraging habitat would not change with any of the alternatives. The foraging habitat for pergine falcons would change with all of the alternatives. This change in vegetation would be expected to provide prey species although the composition may change from species inhabiting later seral classes to those inhabiting earlier seral stages.

The disturbance factor of current and the proposed project going on in the SERP area at once may have a greater effect on species such as pergine falcons, deer, and elk than the changes in vegetation. The disturbance factor is relative to the northern goshawk. Therefore, the Proposed Action would have the greatest potential for high risk of disturbance. Of the action alternatives, Alternative A would have the least amount of disturbance. Alternative B would be intermediate between the Proposed Action and Alternative A.

Regenerating aspen would reduce habitat for species such as three-toed woodpeckers and northern flickers in the short term. However, if not treated, aspen clones would die out and be lost irreversibly in the long term. The Proposed Action treats the most aspen, and Alternative A treats the least amount. Alternative B treats an intermediate amount of aspen when compared to the other action alternatives.

The acreage with desirable amounts of stags and down logs needed to support species such as the Mexican spotted owl, three-toed woodpecker, northern goshawk, bats, flammulated owls, turkeys, flickers, blue grouse and northern flying squirrels would be reduced the most with the Proposed Action. This alternative would treat the most acres, and the treatments would likely reduce snag numbers. The prescribed burns may create some stags, but overall, the amount left standing is expected to be less than with no treatments.

Increasing acreage in VWS 1 increases grass, forbs, and shrubs. This would benefit northern flickers, elk, deer, turkeys, blue grouse, northern flying squirrels, flammulated owls and bats depending upon the sizes of the openings. A larger area would support northern flickers, elk and deer, whereas the rest of the species above would benefit from smaller openings (four acres or less). All of the action alternatives would create openings larger than four acres. The Proposed Action would create the most large openings. Bats, who forage along edges, may not be affected by opening size, and may benefit from increased insects supported by the increased grasses, forbs and shrubs.

The amount of area that would be treated with the Proposed Action combined with past and present activities would be 46% of the forested areas on National Forest land. Alternative A would treat 41%. Alternative B would treat 38% and the No Action Alternative would remain at 23%. The larger the acreage treated, the higher the risk of disturbance to wildlife. The Proposed Action treats both in habitat changes and in disturbance to human activities. Of the action alternatives the Proposed Action has the highest risk of disturbance and Alternative B has the lowest, based on acreage proposed for treatment.

CUMULATIVE EFFECTS:

Future harvest would be conducted on 8,150 acres or 23% of the forested area in the planning area within the last 20 years (see Appendix H). When combined with the harvest, DFS zone, and burning with Alternative A, 27% of the SERP area and 41% of the forested acreage in the CEA would be treated on National Forest land. With Alternative B, 25% of the SERP area and 38% of the forested acres in the CEA would be treated on National Forest land. The Proposed Action would be 30% and 46% respectively. How this applies to the watershed analysis and risk of adverse effects to wildlife is discussed below.

Future foreseeable timber harvest activities in the CEA, with potential affects to wildlife, would be the same as described in the Proposed Action.

The risk rating assessed for cumulative effects to pergine falcons would be the highest with the Proposed Action and the lowest with Alternative A. This is based on the amount of acreage harvested and the opening that such activities would have to procedures activities (1997 through 1999). Although this acreage, when combined with other actions being treated in the SERP area is notable, it is not likely to adversely affect pergine falcons.

There would not likely be cumulative effects of the Alternative A or B on southwestern willow flycatcher. The proposed treatments are not within riparian or willow habitat. The possible effect of livestock grazing move in newly created forage areas from the treatments within and outside the SERP area is not anticipated to be consequential.

Mexican spotted owl habitat was rated moderate in Parowan watershed because of the extensive habitat modification with urbanization, sport fishing, fire protection, and logging. The Chicken Head prescribed burn and Steam Engine salvage with Alternative B (and the Proposed Action) would add to this effect. Large diameter trees would be decreased further and cover would also be reduced. The Steam Engine salvage in Alternative A and B as well as the Proposed Action was designed to maintain connected forest of trees to provide a Mexican spotted owl and other wildlife. This strip connects to those left in the Sidney Valley Timber sale area. Therefore, there would be cumulative effects to spotted owl habitat, but these are not expected to affect spotted owl viability.

Build eagle, Utah prairie dog, and wild turkey are assessed as low in all watersheds, in the CEA because of limited use of the area. The habitat is not expected to be adversely affected by the activities and the risk rating is already low. Alternative A and B would affect turkeys, but the treatment areas are not considered prime turkey habitat, therefore, cumulative effects would be unlikely.

The risk of cumulative effects to northern goshawk is moderate to high, particularly in the Panpunch Lake and Upper Mammoth areas due to lack of large diameter trees, stags and down logs. Large diameter trees were needed for moderate and high ratings for spotted and western and eastern long-eared bats, flammulated owls and northern flickers. Presence of trees that are being visited by recreations contributed to high ratings for bats. Blue grouse and northern flying squirrels also need large diameter trees and stags. Alternative A and B as well as the Proposed Action would reduce large diameter trees and stags, increasing the risk of cumulative effects more than the other action alternatives in the short term. In the long term, the Proposed Action would represent future potential nesting habitat faster (by 20 or 20 years than the other Alternatives. A would come in second with this estimate.

Lack of stags also contributed to three-toed woodpecker’s moderate rating. Reduced options for providing large tracts of unharvested areas for three-toed woodpeckers also contributed to this rating. Alternative B leaves the largest sized blocks, and the Proposed Action leaves the least amount of large blocks. Diversity in the size of the blocks is least with the Proposed Action and greatest with Alternative B. Alternative A leaves blocks with the highest proportion across the forest.

After the spruce balsam infestation subsides, three-toed woodpecker populations would be expected to decline. Three-toed woodpeckers are opportunistic feeders and have been observed in mixed conifer and ponderosa pine stands. These areas may be important in providing habitat during the period of time needed to grow a new spruce
forest. Future harvest treatments in ponderosa pine and mixed conifer habitats should consider the potential interaction since reducing these options further could lead to adverse cumulative effects.

Retaining snags in the SERP area, therefore, is extremely important. Leaving more than the average three per hectare may not be possible, and it is likely that some treatment will be necessary to maintain three per hectare after all activities have been completed because of hazard tree removal during logging and illegal woodcutting. Clumps of snags, which may remain standing longer than individual trees, placed away from easy access from woodcutters would stand a greater chance of longevity.

Lack of large diameter trees not only affects "recruitment" of future snags, but also reduces nesting habitat for northern goshawks. Ponderosa pine habitats have been seriously depleted of large diameter trees. Mixed conifer habitat has also been providing nesting areas for goshawks until larger diameter trees can grow into suitable habitat. Future Proposed Actions in the mixed conifer and ponderosa pine cover types will need to seriously consider these relationships.

Habitat conditions for elk and deer in the CEAs are low for cumulative effects except Parowan. Parowan has high urbanization, road density, and the site is not an area.

**RANGE RESOURCE**

**PROPOSED ACTION**

**DIRECT/INDIRECT EFFECTS** Sanitation and salvage within timber stands would increase livestock forage within the proposed area. Sheep have the potential to damage both planted conifer trees and natural vegetation. If concentrated grazing and bedding occur, increased herbaceous and woody vegetation will appear in those areas. This vegetation is likely to be of higher biological productivity and could affect the ecosystem and reproductive biology of species such as sagebrush and hare. Grazing within the CEAs would increase the microclimate of the understory vegetation which affects the availability of moisture and nutrients for other species such as conifer regeneration. Grazing pressure would reduce the potential for wildfires.

**CUMULATIVE EFFECTS** Grazing within the CEAs would not increase with this alternative. Forage increases would contribute to the increase within the proposed area. Permitted number of sheep and cattle would not increase with the increase in forage. Reasonable foreseeable future actions within the SERP area may contribute to additional effects over the next ten years. Restrictions on grazing for protection of regeneration may coincide with future harvest projects, such as tall forage restoration and watershed rehabilitation. Grazing restrictions associated with the SERP project are lifted, no additional effects from this project are expected to affect livestock grazing. Fencing the proposed areas to protect grazing areas may reduce livestock forage in the short term, until vegetation regeneration efforts are complete.

**SOIL**

**DIRECT/INDIRECT EFFECTS** There would be no change in livestock grazing under this alternative. Grazing of livestock on all the sheep and cattle allotments is confined mainly to the grass openings in the conifer, with no livestock grazing in open areas. Grazing on the Old Woman and White Pine ranges and in the Grouse Creek and the Alpine Creek drainages would be maintained. Grazing of livestock would be conducted in the areas proposed for the proposed study areas. Except for the areas proposed for study, the livestock would be fenced out of the Old Woman and White Pine ranges and in the Grouse Creek and the Alpine Creek drainages. Grazing of livestock on all the sheep and cattle allotments would be confined mainly to the grass openings in the conifer, with no livestock grazing in open areas. Grazing on the Old Woman and White Pine ranges and in the Grouse Creek and the Alpine Creek drainages would be maintained. Grazing of livestock would be conducted in the areas proposed for the proposed study areas. Except for the areas proposed for study, the livestock would be fenced out of the Old Woman and White Pine ranges and in the Grouse Creek and the Alpine Creek drainages.

**HERITAGE RESOURCES**

**ALL ACTION ALTERNATIVES**

**DIRECT/INDIRECT EFFECTS** The proposed action project area has been identified with the potential of sites for cultural features. These sites are not covered by intensive surveys, but there is potential for future sites to be identified. The project team has not identified any potential for future sites to be identified. The project team has not identified any potential for future sites to be identified.

**SPACE ECOLOGY, ECOLOGICAL NETWORKS, AND LIVESTOCK**

**DIRECT/INDIRECT EFFECTS** The proposed action project area is located in the lower elevation areas of the proposed study areas. The project team has not identified any potential for future sites to be identified. The project team has not identified any potential for future sites to be identified.

**SPACE ECOLOGY, ECOLOGICAL NETWORKS, AND LIVESTOCK**

**DIRECT/INDIRECT EFFECTS** The proposed action project area is located in the lower elevation areas of the proposed study areas. The project team has not identified any potential for future sites to be identified. The project team has not identified any potential for future sites to be identified.
especially true in areas where sites are found on slopes greater than five percent and on ridge tops with steep slopes. Prior to burning, those areas where Historic Properties exist, the potential for secondary impacts will need to be evaluated. Mitigation measures, determined on a case-by-case basis, could include laying foam or retardant on the site or immediate revegetation of the area. Revegetation work will need to be done by hand broadcasting or by using light rubber tired vehicles such as "four-wheelers." No eligible historic wooden structures have been located within the Focus Areas where burning is proposed.

The Eagle Historic Forest has adhered to all federal and state laws concerning the protection of Heritage Resources within the boundaries of the Spruce-Fernow Recovery Project.

**NO ACTION ALTERNATIVE**

**DIRECT INDIRECT EFFECTS:** With the No Action Alternative, sites will continue to erode, be vandalized, and deteriorate as now occurs.

**CUMULATIVE EFFECTS:** Cumulative effects for Heritage resources are the same as described in the Action Alternatives and No Action Alternative, above.

**SOCIAL/ECONOMIC RESOURCES**

The effects of implementing the Proposed or alternative to the Proposed Action on the timber commodity sector associated with the social economic setting was determined through an economic efficiency analysis.

The purpose of the analysis was to determine how well financial project inputs would be used to achieve financial outputs. Economic efficiency is measured by "Present Net Benefits," where all monetary flows occurring in different time periods are adjusted to reflect the effects of time on their value. The analysis was based solely on the costs and benefits of timber outputs and the cost of the analysis. Analysis of benefits and cost ratios for other resources were not calculated with this analysis. Benefits and costs for non-commodity resources (i.e., recreation) are difficult to quantify (Robinson 1991). The associated effects to the social economic value related to these non-commodity uses are to be discussed primarily in qualitative terms below.

The full analysis is completed in the Project Rife (Exhibit 23). The economic benefits of the Proposed Action and alternatives to the Proposed Action are displayed using various analysis criteria in Table 4-19 and 4-20.

**Table 4-19. Economic Effects (market resources, Measured by Present Net Value (PNV)).**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>INTEREST RATE = 8%</th>
<th>INTEREST RATE = 7%</th>
<th>INTEREST RATE = 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Action</td>
<td>$303,956</td>
<td>$359,180</td>
<td>$396,236</td>
</tr>
<tr>
<td>No Action</td>
<td>($916,355)</td>
<td>($914,591)</td>
<td>($912,925)</td>
</tr>
<tr>
<td>Alternative A</td>
<td>$292,162</td>
<td>$327,640</td>
<td>$351,811</td>
</tr>
<tr>
<td>Alternative B</td>
<td>$361,327</td>
<td>$406,940</td>
<td>$440,576</td>
</tr>
</tbody>
</table>

*Numbers in parentheses are negative values

The negative Present Net Value (PNV) for the No Action Alternative indicates the cost of the environmental analysis to arrive at the decision of No Action. This cost, or " sunk cost," is common to the Proposed Action and all of the alternatives to the Proposed Action under this approach. Alternative B had the highest PNV ($361,327) at the 4% Forest Service long-term interest rate. The lowest PNV resulted from the No Action alternative ($916,355).

As discussed in the whitepaper "Effects of Vegetation Management on Social Economics," the economic benefits of timber harvest to the Zone of Influence (ZOI) vary according to the nature of the timber to be harvested.

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alternatives, with the exception of the No Action alternative, include salvage and sanitation treatments. Thus, green and salvage timber will be harvested, potentially benefiting the timber manufacturing facilities and logging operations on ZOI, as well as possibly providing other benefits based on the ZOI.

Social conditions are highly variable. Visual perception and attitudes toward timber harvest vary depending on an individual's perception and attitude toward timber harvest. The following discussions in Direct and Indirect Effects and Cumulative Effects are closely related to the Visuals and Recreation discussions of Environmental Consequences. Refer to these sections for more detailed discussions of these resources.

**PROPOSED ACTION**

**DIRECT INDIRECT EFFECTS:** As shown above in Table 4-19, the Proposed Action has a Present Net Value of $303,956. Table 4-20 illustrates that approximately 155 jobs and $7,049,000 in induced income would be generated by this alternative (relational values per $MBH taken from Robinson and Johnson 1991). Road closures and reconstruction, management ignored prescribed fire, establishment of 41 acres of defensible fire suppression zones in the urban-wildland interface, and 966 acres of planting for reforestation, and slash cleanup and disposal to meet with safety, visual and 75s objectives contributed to the costs of this alternative.

**Table 4-20. Economic Effects, Measured by Jobs Created and Induced Income.**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>JOBS CREATED</th>
<th>INCOME PRODUCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Action</td>
<td>155</td>
<td>$7,049,000</td>
</tr>
<tr>
<td>No Action</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alternative A</td>
<td>116</td>
<td>$5,279,000</td>
</tr>
<tr>
<td>Alternative B</td>
<td>155</td>
<td>$7,049,000</td>
</tr>
</tbody>
</table>

Iron County Analysis Unit

The benefits to the Iron County Analysis Unit from the Proposed Action would be limited by the small contribution the timber harvest makes to the diversified local economy. The recreation and tourism industry plus an increasingly important role in the economy of the Iron County Analysis Unit. However, this industry is highly fragmented, creating difficulty in measuring changes due to the effects of the Proposed Action. The economy of the Iron County Analysis Unit is to be diversified than other Analysis Units, and local changes in the economy well. Small communities within this Analysis Unit may be impacted economically, however.

A short term loss of income to businesses and communities dependent upon recreation and tourism may occur as a result of the Proposed Action. The displacement of visitors due to temporary trail closures or a reduced scenic or recreational quality to the Forest could cause visitors to choose alternate locations to recreate, although they may remain in the general area. Scenic quality is expected to be affected up to five years following timber harvest (Brunnecox, 1997). Reforestation limits the long-term effects of scenic quality and reforestation will lessen the degree to which scenic qualities would be immediately affected by timber harvest activities. Brian Head Town is located in this Analysis Unit, being dependent upon recreation and tourism opportunities of the surrounding forest land as a strong part of the economic base. Visitors to the area hire the services and accommodations available at Brian Head. While recreation on nearby National Park, National Forest, Bureau of Land Management, and private lands. The effects of the Proposed Action to Brian Head would take place predominately during the summer season. Short term trail closures and effects to the scenic and recreational quality following timber harvest activities are expected. The temporary closure of the Dark Hollow, Hancock Peak, and Spruces Trails would occur. Trail closures are necessary to protect recreation users from the hazards of true fire, floods, and falling. In the short term, management ignored fire in the timber harvest Focus Areas, the Deer Trail, Focus Area, the Roadless Area, and the Chickamauga. Management ignored temporary displaced visitors to the area through the effects of smoke on air quality or the visibility of a fire-scarred landscape. Smoke emissions from the management ignored prescribed fire could affect visitors and residents through reduced air quality, aggravated respiratory ailments, and a reduced recreational experience. Temporary and permanent residents, property owners, and nearby communities other than Brian Head may also be adversely affected by smoke emissions from a management ignored fire. Long-term effects of management ignored fire could benefit the areas around the renewal of decadent vegetation. Management ignored prescribed fire would reduce the risk of catastrophic wildfire and ease fears of the same
Defensible fire suppression zones would be created next to subdivisions, reducing the risk of wildfire destruction property.

The displacement of recreationists from the Proposed Actions will occur, but the amount of lost tourism associated with the Proposed Action is unknown. If displacement of recreationists occurs due to salvage activities, this could potentially affect some of the Brim Head Town businesses.

The Chicken Head fire management area lies within a cattle allotment (see the Livestock Resource discussion in Chapter 4 for additional information). Continued forest succession from aspen to mixed conifer stands may currently be reducing cattle grazing capacity. Under the Proposed Action, protection of aspen regeneration areas may have the effect of increased costs resulting from increased herding. These costs would be short-term and should be realized for the long-term benefits from maintaining capacities associated with foraging aspen tree species and avian aspen tree species vegetation and aviating an adjustment in cattle numbers. The Proposed Action has the potential of removing natural forested bunches, currently provided by thick timber stands. At the present time, there is no fence between the Dark Hollow allotment and the Brim Head community and ski resort. The creation of these 'openings' in timbered stands may provide avenues for livestock to move onto private lands. The construction of a fence between the Dark Hollow Allotment and private lands is the responsibility of private land owners.

Garfield County Analysis Unit

The CDFG analysis unit may vary from the proposed action if the Escalante sawmill purchases and manufactures the timber. As mentioned previously, the Proposed Action would generate 122 jobs, mainly benefiting the local economy. In this traditionally timber dependent analysis unit, does provide opportunity to forest industry. Income production from forest products would be spent locally, with some being spent in adjacent analysis units or outside the ZOI. The Garfield County Analysis Unit area depends on raw materials produced on National Forest land.

The Garfield County Analysis Unit is becoming increasingly dependent upon the tourism and recreation industry which is evident in the growth of the 'Service' and 'Trade' sectors of the economy. The Analysis Unit is both a primary destination as well as a place of transition to the other recreational destinations on Federal, State, or private lands. Visitors purchase goods and services from the Analysis Unit, providing a source of income to the local businesses and ties to the local government.

The Proposed Action would displace some visitors using these goods and services. The community of Panaguate Lake is a pick up location for mountain bikers riding from the Brim Head and a common trail area in the project area can displace these recreation users. The Proposed Action may have an effect on the income generated to Panaguate Lake businesses the recreation and tourism industry. Other recreation users may be displaced also, reducing the income to businesses in the Analysis Unit. Due to the fragmentation of the recreation and tourism industry, it is difficult to measure the effects to local businesses and economies. Smoke emissions from management ignited prescribed fire may affect visitors, residents and visitors in the project area, reducing air quality, aggravated respiratory ailments, and a reduced recreational experience. Temporary and permanent residents, property owners, and nearby communities may also be affected by smoke emissions from a management ignited fire. Long-term effects of smoke management ignited fire would be reduced through the route of trails crossing timber harvest areas. Closer to temporary, and existing roads would replace recreation users, especially recreational drivers. Reduction of RVD's that may result from the Proposed Action may be offset by annual increases.

Garfield County Analysis Unit

The Garfield County Analysis Unit would benefit from the most from the Proposed Action due to the active timber manufacturing facility located in Escalante. Jobs for mill workers would be sustained. Local communities would benefit as income produced is spent in the local communities. Reasonably foreseeable projects would promote the timber industry with a future supply of raw material. Increased visitation to area National Parks, State Parks, Bureau of Land Management lands, and the Escalante National Monument and National Forest lands within the ZOI is responsible for majority of the growth in visitation to the Analysis Unit. Reduction of RVD's that may result from the Proposed Action, including planned trail closures, harvest activities, and prescribed fire effects, may be offset by annual increases in RVD's. A thriving recreation and tourist industry, coupled with the continuation of the timber industry, would provide for a healthy economy capable of sustaining the local communities.

Kane County Analysis Unit

The Proposed Action would have little effect on the Kane County Analysis Unit, unless the timber industry were redeveloped and tourism is redeveloped. Tourism is the largest industry in the Kane County Analysis Units. Effects of the Proposed Action to this analysis unit are difficult to measure due to the fragmented nature of the industry. It is difficult to separate visitors to other destinations from the Kane National Forest. Visitors to the Escalante Drainage Basin area use the goods and services provided in the Kane County Analysis Unit, specifically, Duck Creek Village. Displacement of visitors from the project area may affect income to local businesses in Escalante and other communities in the Analysis Unit. Smoke emissions from a management ignited prescribed fire could affect visitors and residents through reduced air quality, aggravated respiratory ailments, and a reduced recreational experience. Temporary and permanent residents, property owners, and nearby communities may also be affected by smoke emissions from a management ignited fire. However, temporary and permanent residents are not likely to sell their property and move because of the temporary effects of harvest activities or smoke.

Space Ecosystem Recovery Project

Long-term effects of management ignited fire could benefit the resources of the area through the renewal of vegetation. Management ignited prescribed fire would reduce the risk of catastrophic wildfire and can reduce the risk of wildfire destroying property.

CUMULATIVE EFFECTS: Regional, National, and Global conditions determine Recreation Visitor Day (RVD) fluctuations. The large portion of the visitors to the zone come from Nebraska, Southern California, and Arizona. As populations of these areas increase, RVD's are expected to increase.

Past timber management activities within the ZOI have not led to a appreciable decrease in RVD's. Displacement of recreation users has occurred in areas where management activities were active. Roads and trails developed for such vegetation management activities have increased access for recreation areas to areas that were not previously accessible, except by hikers and horsebackers. Within the ZOI, effects of the Proposed Action, past actions, and forest resource actions would vary.

Iron County Analysis Unit

The diversified economy of the Iron County Analysis Unit would minimize any beneficial effect the Proposed Action would have. The local timber industry consists of small operators. Visitor use trends indicate that growth in visitation, measured by RVD's, is expected to continue. Summer recreation use is experiencing the most growth in visitation, measured by RVD's. Recreational use is attributed to advertising by local communities and businesses. Summer recreation contributes the highest proportion of RVD's in the project area. Logging activities within the Brim Head Recovery Project area, such as the Mammoth Trunk Duck Creek Project area may compete with the Proposed Action, displacing recreationists. Displacement of recreation users may occur due to the noise, traffic, and temporary closure of trails during harvest activities. The displacement may be exacerbated due to smoke emissions from management ignited fire. Management ignited fire would be reduced through the route of trails crossing timber harvest areas. Closer to temporary, and existing roads would replace recreation users, especially recreational drivers. Reduction of RVD's that may result from the Proposed Action may be offset by annual increases. Livestock grazing would not increase with this alternative refer to the Cumulative Effects discussion on Livestock Grazing in chapter four. The Space Ecosystem Recovery Project may compete with reasonably foreseeable future projects which may add costs in fence construction and maintenance, as well as herding.

Garfield County Analysis Unit

The Garfield County Analysis Unit would benefit from the most from the Proposed Action due to the active timber manufacturing facility located in Escalante. Jobs for mill workers would be sustained. Local communities would benefit as income produced is spent in the local communities. Reasonably foreseeable projects would promote the timber industry with a future supply of raw material. Increased visitation to area National Parks, State Parks, Bureau of Land Management lands, and the Escalante National Monument and National Forest lands within the ZOI is responsible for majority of the growth in visitation to the Analysis Unit. Reduction of RVD's that may result from the Proposed Action, including planned trail closures, harvest activities, and prescribed fire effects, may be offset by annual increases in RVD's. A thriving recreation and tourist industry, coupled with the continuation of the timber industry, would provide for a healthy economy capable of sustaining the local communities.

Kane County Analysis Unit

The Proposed Action would least affect the Kane County Analysis Unit. Visitations to this analysis unit is increasing and is only partially dependent upon the recreation opportunities of the National Forest lands. Nearby National Parks and Recreation Areas, State Parks, and Bureau of Land Management lands, and the Escalante National Monument have increased visitation to the area. Reduction of RVD's that may result from the Proposed Action, including planned trail closures, harvest activities, and prescribed fire effects, may be offset by annual increases. Potentially, the Kane County Analysis Unit could benefit from the Proposed Action of the timber industry were redeveloped.

NO ACTIVITY

DIRECT IMPACT: None

The No Activity Option is not within the ZOI. The boundary of the Escalante National Monument has been generated the increased visitation to the area. Reduction of RVD's that may result from the Proposed Action, including planned trail closures, harvest activities, and prescribed fire effects, may be offset by annual increases. Potentially, the Kane County Analysis Unit could benefit from the Proposed Action of the timber industry were redeveloped.

Space Ecosystem Recovery Project

The Space Ecosystem Recovery Project may compete with reasonably foreseeable future projects which may add costs in fence construction and maintenance, as well as herding.
Cedar City Ranger District
Dixie National Forest

Environmental Consequences

Iron County Analysis Unit

There would be no measurable benefits from No Action to the Iron County Analysis Unit. The No Action alternative would not address the public safety risk of dead and dying trees blowing down, causing injuries and loss of life. The risk of catastrophic wildfire would not be decreased through the use of management actions prescribed for the creation of the desired fire suppression zones. Blind Head Town could be adversely affected by the above effects as stated, given a No Action alternative.

Garfield County Analysis Unit

Under the No Action alternative, this opportunity to purchase timber from the project area would be lost. There would be no benefits to the Garfield County Analysis Unit. Public safety would not be addressed where the risk of dead and dying trees blowing down exists. The risk of catastrophic wildfire would not be decreased through the use of management actions prescribed for the creation of defensible fire suppression zones.

Kane County Analysis Unit

As discussed under the Iron and Garfield County Analysis Units, public safety would not be addressed where the risk of dead and dying trees blowing down exists. The risk of catastrophic wildfire would not be decreased through the use of management actions prescribed for the creation of defensible fire suppression zones.

Cumulative Effects

Iron County Analysis Unit

Due to the diversification of the economy of this analysis unit, the adverse impacts to the county as a whole would be limited to local

Garfield County Analysis Unit

Recent declines in commodities-based employment have adversely affected the Garfield County Analysis Unit. Further reductions of a sustainable supply of timber could adversely affect the town of Fauclante, specifically, and the surrounding communities and counties through the loss of spending of income generated in the locality.

Kane County Analysis Unit

The Kane County analysis unit is heavily dependent upon recreation and tourism as sources of income. Any impact from the No Action alternative would be compensated for by the overall increase in visitation to the analysis unit.

Alternative A

Immediate Effects

As shown in Table 4.19, the PNV for Alternative A is $2,927,265. Table 4.20 illustrates that approximately 116 jobs and $5,278,000 in induced income would be generated by this alternative with total values per MeB2 taken from Rotherham and Vernon (1991). Road closures and reconstruction, management actions prescribed for, establishment of 41 acres of defensible fire suppression zones in the urban wildland interface, and 645 acres of planting for reforestation, and slash cleanup and disposal to meet with safety, visual, and fuels objectives contributed to the costs of this alternative.

Iron, Garfield, and Kane County Analysis Units

Alternative A differs from the Proposed Action on the exclusion of the Spruces Focus Area, sites 3 and 4 in location 110 in Boulder State, and the Chicken Head management ignited fire area. The volume to be removed is reduced with the exclusion of the Spruces Focus Area. Adverse effects of prescribed fire to Blind Head would be lessened due to the exclusion of management ignited fire in the Chicken Head. Treatments in sites 1 and 4 next to Rainbow Meadows subdivision are also excluded in Alternative A. Laying the direct effects of prescribed fire on that otherwise. The exclusion of recreation users will be lessened by Alternative A because the Spruces Focus Area is excluded, leaving the Spruces Trail unaffected by temporary closures necessary for safety within Focus Areas. The effects to livestock grazing in the Chicken Head would be similar to the No Action alternative, resulting in the status quo. All other effects of Alternative A are similar to the Proposed Action

Cumulative Effects

Refer to the discussion of cumulative effects under the Proposed Action for Alternative A.

Alternative B

Immediate Effects

The Present Net Value of Alternative B is $3,061,327. As illustrated in Table 4.19, approximately 116 jobs; and $5,078,000 in induced income would be generated with total values per MeB2 taken from Rotherham and Vernon (1991). Road closures and reconstruction, management actions prescribed for, establishment of 41 acres of defensible fire suppression zones in the urban wildland interface, and 966 acres of planting for reforestation, and slash cleanup and disposal to meet with visual and fuels objectives contributed to the costs of this alternative.

Iron, Garfield, and Kane County Analysis Units

The difference between the Proposed Action and Alternative B is in the exclusion of the Roadless Focus Area. The effects of Alternative B are very similar to the Proposed Action. The exclusion of the Roadless Focus Area lessens the adverse effects of prescribed fire on the analysis units.

Cumulative Effects

Refer to the Proposed Action for the discussion of cumulative effects for Alternative B.

Effects of All Alternatives on Road Routes

Direct Indirect Effects

The greatest effect to the Social and Economic environment is expected within the social environment, concerning the recreation/logging interface on public highways. The route heading east on Highway 143 to Panguitch, Utah would be less impacted than the route west through the Town of Blind Head. The route east is less congested and has gentler grades and curves. Residents along this route are accustomed to logging traffic due to past milling operations in Panguitch, the current stockpiling of logs in Panguitch for shipment outside the ZOD and the mill in Escalante. Log trucks are frequently seen traveling this route.

The haul route to the west is of greatest concern due to the high recreation traffic in the Town of Blind Head. Mountain bike traffic from June to November is expected to require an increased public safety awareness program. Refer to Table 4.21 for additional haul route information.

An additional social impact related to the western haul route is that townpeople are unaccustomed to seeing log trucks traveling this route. There may be some short term effects by heavy log truck traffic traveling this route on the types and amounts of recreation users frequenting this area, especially mountain bike users. The public awareness programs that would be established to help with public safety would also provide interpretive services describing the needs and reasons for this short term increase in truck traffic to recreation users. With proper implementation of interpretive programs and cooperation and coordination with those affected, impacts to the Town of Blind Head would be minimized.

Table 4.21 provides additional information of effects for the Proposed Action and all alternatives. Potential effects from timber hauling include the total number of loads, loads per day, time between loads, and the haul duration.

Table 4.21. Haul Route Use Facts

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PROPOSED ACTION</th>
<th>NO ACTION</th>
<th>ALT. A</th>
<th>ALT. B</th>
</tr>
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<tr>
<td>Total Loads</td>
<td>2,700</td>
<td>0</td>
<td>1,970</td>
<td>2,700</td>
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<tr>
<td>Loads Day</td>
<td>18</td>
<td>0</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Minutes between loads</td>
<td>40</td>
<td>0</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Haul duration (months)</td>
<td>7</td>
<td>4.9</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.21 estimates are based on the following assumptions: 1) Log hauling would utilize log trucks with a variable gross weight (TVPs) of 30,000 lbs. 2) The hauling schedule would occur 4-12 days per week (12 work hours). 22.2 hail days per 30 day period. 3) The load frequencies calculated are for loaded trucks, empty trucks would operate at similar frequencies in the opposite direction. 4) Sales would likely be awarded to several contractors and haul routes may consequently vary.

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AIR QUALITY

Impacts to air quality from prescribed burning and wildfires include the temporary visibility impairment caused by smoke and health problems that may be associated with short-term exposure to low-level criteria pollutants.

Because of the dynamic nature of the air resource, effects on air quality at a given location are highly unpredictable. Sources of pollutants such as dust and smoke may be many miles from the location that is experiencing diminished air quality. Recognized sources of pollutants that are important to the air quality within the project area are discussed in this section.

EFFECTS COMMON TO ALL ACTION ALTERNATIVES

DIRECT/INDIRECT EFFECTS

Direct effects on air quality within the project area and for smoke sensitive areas in surrounding counties may occur only slightly by alternative. Under all action alternatives adverse effects to air quality within 5 miles of the proposal area may occur from the incomplete combustion of fuels in motorized equipment and vehicles, and from road dust produced by construction and moving vehicles, and from smoke generated by prescribed burning within the project area.

Due to current fuel loadings on the site (average 13 tons/acre) and additional fuels created through logging (5 to 10 tons/acre), slash would be treated by piling and burning. Jackpot burning or broadcast burning. Fuels deposited at landing locations will be sold as firewood, chopped and scattered or piled and burned. The fumes and road dust produced by the project activities would be short-term, but would occur on an intermittent basis. Woodsmoke from ideal wood smoke may cause more visible degradation of air quality than fumes. This would be mitigated through a dust abatement provision in the timber sale contract that requires the purchaser to periodically dampen haul roads.

Air Quality in the closest class-1 airsheds, Zion National Park and Bryce Canyon National Park, may be affected during periods of prescribed burning. This would only occur during periods of unexpected weather changes. Visual quality, looking outside the park towards the burn, may be affected for short periods of time (1-3 hour/day).

Approximately 214 acres of pile/jackpot burning and 3,895 acres of broadcast burning would be completed under the Proposed Action. Approximately 134 pile/jackpot burn acres and 2,792 broadcast burning under Alternative B. Pine/jackpot burning sites would range in size from 0.001 acres to approximately 1 acre. Broadcast burning would treat approximately 25% of the acres per year for 4 years or approximately 472 acres/year. Approximately 5 to 10 tons of slash/acre would be treated by piling and burning. Slash burning would occur early spring to late fall. Burning would be accomplished as a ground smoke dispersal as outlined in the Smoke Management section of the Proposed Fire Burn Plan. Smoke Management regulations. "Clearing Index," for the State of Utah would be followed during all prescribed Fire activities.

CUMULATIVE EFFECTS

No measurable long-term cumulative effects occur within the identified cumulative effects area, from implementation of any of the action alternatives (See: SASEM outputs, Project File, exhibit 23). No measurable long-term cumulative effects would occur in Brian Head town, Zion National Park, Bryce Canyon National Park, or Grand Staircase-Escalante National Monument.

Air Quality

The proposed action does not appear to significantly change the ambient air quality and would be consistent with the Utah Air Quality Standards for carbon monoxide and particulate matter. It is estimated that no significant short-term or long-term health effects would be associated with the proposed action.

No Action Alternative

DIRECT/INDIRECT EFFECTS

Under this alternative, no timber harvest activities would occur, and there would be no immediate effects on air quality by prescribed fire. The continued loss of forest cover to sparsely forest would not in itself contribute to the air quality issues, however, the increase risk of wildfire due to dead and dying trees would. Nature would eventually burn the area causing unplanned and unmitigated accumulations of smoke.

CUMULATIVE EFFECTS

Since no action would occur under this alternative there would be no cumulative effects.

SPECIAL USES

Forty special use permits were identified in the Affected Environment section in Chapter Three. Of the 40 permits, nine special use permits may be affected by the Proposed Action or two Action Alternatives. The special use permits discussed in this section include six recreational events (3 permitted), and six outfitter and guide permits. Effects associated with these special use permits will be discussed by alternative.

PROPOSED ACTION

DIRECT/INDIRECT EFFECTS: The Spruce Ecosystem Recovery Project emphasizes Focus Area where implementation of management activities would occur. Within the Hankow and Louder/State Focus Areas there are no fixed special use permits or FLPMA easements. However, four outfitter and guide permits may be effected as a result of commercial tree harvest and aspen regeneration treatment. The four outfitter and guide permits, which include three district wide big game hunting permits (#5295, 5426, and #9037) and one district wide mountain biking permit (#5460). The direct effects to the outfitter and guide permits would likely result in displacing the permitted use outside of the Focus Areas. The potential displacement is not likely to adversely effect the visibility of the permittee. No recreational events are located within either the Hankow or Louder/State Focus Areas.

The Spruces Focus Area contains no fixed special use permits, FLPMA easements, or recreational event permits. However, six outfitter and guide permits may be effected as a results of commercial tree harvest. Of the six outfitter and guide permits, three are district wide big game hunting permits (#5295, same impacts as above). The direct effects to these hunting permits would likely result in displacing the permitted use outside of the Focus Areas. The potential displacement is not likely to adversely effect the visibility of their operation. In addition to the hunting permits, there are two mountain bike outfitter and guides (#5446, 5466) that have permitted access to the Spruces Trails for the purpose of guided tours. The closure of the Spruces Trail would directly effect permit holder #5446, as they will not have access to a previously marketed route during this time. While permit holder #5462 has permitted access, they have not utilized the Spruces Trail, nor indicated an interest to do so. Timely notification, consultation, and the outfitter and guides annual operating plans should be coordinated to reduce the potential impacts.

Additionally, outfitter and guide permit number #4562 may be directly effected from implementation of activities associated with the Spruces Focus Area, as the permittee uses the Sidney Valley Road for touring purposes. The potential displacement for the heavy equipment or logging trucks on the Sidney Valley Road may present safety concerns. The timing of the Spruces Focus Area activities and the permittees annual operating plans should be coordinated to mitigate potential impacts.

The Steam Engine Focus Area contains the Dark Hollow Trail that has the potential to impact six recreational events (permits: #1452, #1004) and three outfitter and guide permits (#5446, 5466, and #5490). The rerouting of the Dark Hollow Trail entirely onto National Forest lands is proposed with this action. The rerouting of the Dark Hollow Trail and trail buffer will have a beneficial impact on the outfitter and guide permits effected. Additionally, three big game hunting outfitter and guide permits may be effected because of commercial tree harvest within the Steam Engine Focus Area. They include permits (#5295, 5426, and #9037). The direct effects to the big game hunting outfitter and guide permits would likely result in displacing the permitted use outside of the Focus Areas. The potential displacement of the permits is not likely to adversely effect the visibility of the permittee. No fixed improvements or FLPMA easements will be impacted in the Steam Engine Focus Area.

The Bunker Focus Area will implement a reroute on the Left Fork of Bunker Creek Trail. This reroute will benefit two permitted recreation events (#1452) and three outfitter and guide permits authorized to use this area (#5446, 5466, and #5490). However, three big game hunting outfitter and guide permits may be affected as a result of commercial tree harvest within the Bunker Focus Area. They include permits (#5295, 5426, and #9037). The direct effects to the big game hunting outfitter and guide permits would likely result in displacing the permitted use outside of the Focus Areas. The potential displacement is not likely to adversely effect the visibility of the permittee. No fixed improvements or FLPMA easements will be impacted in the Bunker Focus Area.

Within the Deer Creek Focus Area there are no fixed special use permits or FLPMA easements. These outfitter and guide permits may be effected as a result of management activities. The three outfitter and guide permits include district wide big game hunting permits (#5295, 5426, and #9037). The direct effects to the outfitter and guide permits would likely result in displacing the permitted use outside the Deer Creek Focus Areas. The potential

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displacement is not likely to adversely effect the viability of the permittee. No recreational events are located within either the Deer Creek Focus Area.

The Chicken Focus Area may impact recreation events and outfall acid storms operating on the Dark Hollow and Spruces Trails. This includes permits #5152, #1994, #5436, #5402, & #5409. The prescribed burning may restrict access due to smoke and fire activity. In addition, three outfall and guide permits may be affected as a result of management activities. The three outfall and guide permits include district wide big game hunting permits #5295, 5426, & #9037. The direct effects to the outfall and guide permittees would likely result in displacing the permitted use outside the Chicken Focus Area. The potential displacement is not likely to adversely effect the viability of the permittee. This impact is anticipated to be short-term in nature resulting in minor displacement. Coordination between the prescribed burning, recreational events, and outfall and guide operating plans should occur to reduce impacts.

Prescribed burning associated with the Roadless Focus Area may effect the Ats Quao Archery Club, Mitchell Sawmill, shoot Fire activities and smoke may affect the safety of the participants in this recreational event. Coordination through the permittees annual operating plan should occur to mitigate the potential impacts. In addition, three outfall and guide permits may be affected as a result of management activities. The three outfall and guide permits include district wide big game hunting permits #5295, 5426, & #9037. The direct effects to the outfall and guide permittees would likely result in displacing the permitted use outside the Roadless Focus Areas. The potential displacement is not likely to adversely effect the viability of the permittee. This impact is anticipated to be short-term in nature resulting in minor displacement.

CUMULATIVE EFFECTS
There would be no cumulative effects associated with the Proposed Action to the Special Uses discussed above. When the timber sale contract is complete, the special use permits would continue as they have in the past.

NO ACTION
DIRECT/INDIRECT EFFECTS
Under the No Action Alternative, the existing authorized special use permits would continue to operate as they have in previous years. Some permits would expire and may be renewed over time. New applications for special uses would be reviewed and analyzed. Trails used by outfitter and guides may change as new markets emerge. Fixed improvements would be maintained to the extent possible and FLPIA easements would remain in place.

ALTERNATIVE A
DIRECT/INDIRECT EFFECTS
The effects described for the Proposed Action are very similar to Alternative A. The main difference is between these alternatives is a reduction in the volume removed and in management grouped fire prescribed in Alternative A. However, the difference in effects previously described for the Proposed Action would not be measurable. Refer to the Environmental Effects discussion for the Proposed Action for effects to Special Uses.

CUMULATIVE EFFECTS
There would be no cumulative effects associated with Alternative A to the Special Uses discussed above. When the timber sale contract is complete, special use permits would continue as they have in the past.

ALTERNATIVE B
DIRECT/INDIRECT EFFECTS
The effects described for the Proposed Action are very similar to Alternative B. The main difference between these alternatives is a reduction in the management grouped fire prescribed in Alternative A. However, the difference in effects previously described for the Proposed Action would not be measurable. Refer to the Environmental Effects discussion for the Proposed Action for effects to Special Uses.

CUMULATIVE EFFECTS
There would be no cumulative effects associated with Alternative B to the Special Uses discussed above. When the timber sale contract is complete, special use permits would continue as they have in the past.

Environmental Consequences

Cedar City Ranger District
Dixie National Forest

FIRE/FUELS

Fire can best be addressed by differentiating wildfire from management ignited prescribed fire. Wildfires have the potential to affect many natural processes (Boyer and Deil, 1980) including soil, plant succession, air quality, water, microclimate wildfire, and fish. Wildfire effects can be both beneficial and destructive. The cumulative effects of wildfire are calculated by a ratio determined from suppression cost, plus the net present value change. The rate of spread and intensity of wildfires is reduced by roads and harvesting, which create a mosaic of vegetation and fuel accumulation. Current wildfire risk in the SERP area is associated primarily with the dying of beetle infested Engelmann spruce and the subsequent accumulation of large amounts of fuel. Of primary concern is the effect of the dead and dying Engelmann spruce and the respective accumulations of biomass from this mortality on the intensity, rate of spread, and the ability to control forest fires.

The risk of wildfire is particularly important in terms of fires that may occur on the National Forest lands and have the potential to burn onto private lands. Increased risk of wildfire would increase the potential loss of life and personal property on private lands and residences. With the high density of dead and live material adjacent to and within the SERP area, a favorable environment exists for ignition and rapid spread of wildfire during periods of extremes in temperatures, winds, and low fuel moisture.

Other potential impacts due to wildfire risk include losses of biding cover and thermal cover for big game species, potential loss of fish during suppression activities, and losses of water quality and quantity. Additionally, there is a high probability of uncontrolled alteration of vegetative communities which would result in regeneration of seral shrub species and/or regeneration of tree species that may not meet Forest Plan objectives.

PRESCRIBED FIRE

Prescribed fire is a management tool used for hazard reduction to reduce the amount of timber harvesting slash and prepare the site for seed germination and seedling establishment. Prescribed fire has also been used to reduce the amount of fuel buildup under some species of trees to reduce the intensity of potential wildfires.

Fuels within the SERP area would be treated with a combination mechanical log and scatter, hand and machine piling, and burning.

Prescribed fire treatment in the "Chicken Head" and "Roadless Area" is designed to emulate the natural role of fire in these vegetation types. Fire group 10.11 and 11.1 have long fire return intervals. Fire intervals between 50 to 130 years in fire group 10 (Arno 1980), 325 to 635 years in fire group 11 (Mather 1982), and 50 to 300 years in fire group 12 (Arno 1980, 1990; Henselmit 1991).

When fire does return to these fire groups it is typically high severity, crown fire rather than moderate severity fire.

FIRE HISTORY

No site-specific data was collected for the project area. However, using the accepted protocol described in Fire and Ecology of Forests and Woodlands in Utah (Bradley, et al. 1992) and determining fire groups to fuel models, we can estimate fire return intervals. The project area contains two-specific fire groups, Fire Group 10 and Fire Group 12. In fire group twelve, (Cold, upper subalpine habitat types) the intervals are between 50 and 300 years fire (Arno 1980, Henselmit 1991). In fire group 10-Dry lower subalpine habitat types the interval is estimated to be 50 to 130 years (Arno 1980). Upon review of the fire records for the SERP Project (1970 through 1994), 31 fires were suppressed. Eighteen of these were human caused while 13 were lightning caused. The largest of these fires was three acres in size. Mean acture size is 26 (Forest Plan Goals and Objectives).

EFFECTS COMMON TO ALL ACTION ALTERNATIVES

In harvested areas, the fuel volumes would be reduced with removal of the larger fuels, lowering the resistance to wildfire control efforts. Lopping and scattering the non-merchantable material on the ground would expedite the decay of the woody debris.

The resulting mosaic, created by the harvest and prescribed fire, would provide natural fuel breaks in the landscape. Harvesting spruce mortality areas would remove the larger dead and dying materials that provide
additional fuel and increase fire intensities. Slash burning private lands would be easily accessible due to additional roads thereby enhancing suppression efforts and slash treatment.

**PROPOSED ACTION**

**DIRECT/INDIRECT AND CUMULATIVE EFFECTS:**

**Harvest**

The Proposed Action would bring the total treated area under management. Timber harvest would occur on approximately 2872 acres.

The area would be treated with a combination of strip and scattered slash and pile burning. Existing fuels, approximately 13 tons/acre, combined with an additional 7 to 10 tons/acre of logging slash would result in fuel loads approximately 25 tons per acre (See Project File, exhibit 30). After fuel treatments, approximately 10-15 tons of slash per acre would be maintained to allow for nutrient recycling.

Under the Forest Plan (IV-541), fuels are to be reduced so the potential fireline intensity of an area will not exceed 400 Btu when 90 percent of the days during regular fire season or break up fuel concentrations exceeding the above standard into manageable units with fuel breaks or fire lanes. Fuel breaks will be created through skid trails, roads, created openings and meadows.

This alternative will bring fuels in the treatment areas under regular management and thereby meet Forest Plan guidelines (See Project File, exhibit 30).

Harvest units would be distributed throughout the SERP analysis area, creating a mosaic of treated and untreated areas. The risk of new fire starts and the potential for catastrophic fire would be reduced due to the breakup of fuel continuity and reduction of fuel loadings.

**Sage Regeneration**

Approximately 1013 acres is proposed for aspen regeneration. These area are proposed for treatment with a combination of fuel wood removal, commercial tree harvest and prescribed fire. Treatment of aspen stands that are threatened with coarse invasion will occur to promote aspen regeneration. Removing the invasion conifer will reduce the severity of wildfires that may start in these stands by eliminating the ladder fuels.

**Defensible Fire Suppression Zones**

Zones around urban interface and primary travel routes where a lot of property could occur have been identified for both private and public lands in an attempt to reduce the chance for spread of wildfire. Fuels in these areas will be reduced to a level that the fire suppression personnel will have a chance to combat a wildfire. Fuel loading in these areas will be less than 10 tons/acre with ladder fuels removed. Approximately 41 acres are proposed for treatment.

**Reintroduction Of Fire**

Management prescribed fire will be used to reintroduce fire into two areas identified in the SERP project area. The Chicken Head (1993 acres) and Roadless area (12792 acres) are areas identified to have some of the best fuel characteristics for prescribed fire. Both areas have long interval stand replacement fire regimes. The goal of the reintroduction of fire is to duplicate the way fire would naturally occur and to break up continuous blocks of fuel. Fuel loadings are approaching levels that would contribute to ignitions. Controlling the time of year management ignite prescribed fire will let managers control the severity of the burn and safely reduce fuel loadings. Stand replacement fire of 1000 acres would be planned in the late summer and into the fall of the year. This time of year would be when fires would naturally occur and have the best associated risk because of the season ending event reducing the fire's severity.

**NO ACTION ALTERNATIVE**

**DIRECT/INDIRECT AND CUMULATIVE EFFECTS:**

No fuel treatment would be accomplished under this alternative. Standing beetle killed trees would be allowed to deteriorate and fall to the ground and accumulate naturally. The risk of large wildfire would increase as fuels from the beetle killed trees fall to the ground and become available fuel. This alternative fails to address the serious problem of long term fuel accumulation which will average 30 to 40 tons/acre within 20 to 30 years (See Project File, exhibit 30).

The risk of large wildfires occurring in the analysis area would remain very high for many decades.

**ALTERNATIVE A**

**DIRECT/INDIRECT AND CUMULATIVE EFFECTS:**

With this alternative no treatment of Chicken Head Focus Area and sites near Rainbow Meadows would occur and so would eliminate the reintroduction of fire in the vicinity of Brian Head Town. The risk of large wildfire would increase in that area as fuels from the beetle killed trees fall to the ground and become available fuel. Regeneration of aspen from prescribed fire (156 acres) would not occur. This alternative fails to address the serious problem of long term fuel accumulation in the area which will average 30 to 40 tons/acre within 20 to 30 years. This alternative least addresses the purpose and need to reduce fuel loadings to the desired condition in the Brian Head area which will reduce the risk of catastrophic fire. It's better than Alternative B however, for the entire SERP area.

**ALTERNATIVE B**

**DIRECT/INDIRECT AND CUMULATIVE EFFECTS:**

This alternative would eliminate the reintroduction of fire in the Roadless Area. The risk of large wildfire would increase as fuels increase from beetle killed trees in the vicinity of this Focus Area. Regeneration of aspen from prescribed fire (557 acres) would not occur. This alternative least addresses the purpose and need of reducing fuel loadings to the desired condition in the entire SERP area but does in the Brian Head area.

**TRANSPORTATION**

This report will address Focus Areas and access to them only. Road mileages for this report were obtained through GIS.

Road costs used for all alternatives:

**ROADS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Road Reconstruction</td>
<td>5,000</td>
</tr>
<tr>
<td>Local Road Construction</td>
<td>9,000</td>
</tr>
<tr>
<td>Reconditioned (if roads)</td>
<td>900</td>
</tr>
<tr>
<td>Temporary Road Construction</td>
<td>1,200</td>
</tr>
</tbody>
</table>

These costs would include all necessary work to restore or construct road templates needed to access these areas. Also any necessary drainage or intercepting ditches would not be included in these costs. B corrugated metal pipe, bridges or other drainage structures are required the above costs would be higher. Surfacing costs are not included in these costs. If surfacing is required by some mitigating measure these costs would rise according to the quantity needed and the haul distance. There exists a surplur of surfacing material near the Focus Areas. It is located just west of the South Valley (320B4). U-143 punch. Surfacing costs could be kept to a minimum by using material encountered during construction or reconstruction. As no in-depth record of these areas have been completed, these areas will have to be identified either before or during road construction, reconstruction or reconditioning. Road work and other related activities would be governed by Forest Service Standard Specifications. Mileages of construction, reconstruction or reconditioning for each Focus Area are estimates taken from GIS maps, and could change accordingly to the ground conditions.

**PROPOSED ACTION AND ALTERNATIVE B**

**DIRECT/INDIRECT AND CUMULATIVE EFFECTS:**

The Proposed Action and Alternative B would include 4.34 miles of new construction, 4.75 miles of reconstruction, 20.17 miles of reconditioning and 80 mile of temporary road construction.
### Table 4-22. Miles and cost of road construction, reconditioning and temporary roads for the Proposed Action and Alternative B.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Total Miles</th>
<th>Miles Construct. Dollars</th>
<th>Miles Reconstruct. Dollars</th>
<th>Miles Recon. Dollars</th>
<th>Miles Recon. Dollars</th>
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</thead>
<tbody>
<tr>
<td>Spruces</td>
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<td>Stream</td>
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<td>Machine</td>
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<tr>
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<td>4.30</td>
<td>36,960</td>
<td>4.75</td>
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### ALTERNATIVE A

**DIRECT/DIRECT EFFECTS:** Alternative A eliminates the Spruces Focus Area. Under this alternative there would be 4.25 miles of reconstruction, 14.17 miles of reconditioning, and 30.06 miles of temporary road construction.

### Table 4-23. Miles and cost of road construction, reconditioning and temporary roads for Alternative A.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Total Miles</th>
<th>Miles Construct. Dollars</th>
<th>Miles Reconstruct. Dollars</th>
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<td>14,875</td>
</tr>
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**Cedar City Ranger District**

**Dixie National Forest**

### FOREST PLAN CONSISTENCY

As discussed in Chapter One, this FES is tiered to the Final Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan (Forest Plans). It documents the analysis in the second level of planning. Changes in land use designation which have been established in the Forest Plan were not evaluated in this analysis.

In the Forest Plan, the National Forest land within the Dixie National Forest has been divided into Management Areas—which differ from each other in resource emphasis. The Management Areas that fall within the SRP area were fully discussed in Chapter One of this FES—patial location of these Management Areas within the SRP area can be found in Appendix 2 of this FES.

A detailed discussion of the Forest Plan standard and guideline consistency for each area resource can be found in each resource report located in the Project File.

Disclosures within this FES and Project File resource reports clearly display that implementation of the Proposed Action, or action alternatives to the Proposed Action, including their specific mitigation, would be consistent with the Forest Plan standards and guidelines, goals and objectives, and desired future conditions.

### COMPLIANCE WITH OTHER LAWS AND REGULATIONS

Implementation of the Proposed Action is consistent with the Forest Plan Goals and Objectives for aquatic habitats (§ 4.5). The proposed road closures and rehabilitation will help move the aquatic habitats towards the desired future condition (DFC) as outlined in the Forest Plan (§ 4.20, 4.235, and 4.144). The Proposed Action is in compliance with the National Forest Management Plan with regards to the following: 219.27 (i)(4) protect streams-streambanks and other bodies of water; 219.27 (i)(6) provide adequate habitat to maintain viable populations; 219.27 (i)(7) special attention to land and vegetation adjacent to perennial streams and other bodies of water. A more detailed discussion on consistency and compliance with the Forest Plan and other laws and regulations is provided in the Sydney Valley Recovery EA (§ 4.42, 104).

Implementation of Alternative A is consistent with the Forest Plan Goals and Objectives for aquatic habitats (§ 4.5). The proposed road closures and rehabilitation—will help move the aquatic habitats toward the desired future condition (DFC) as outlined in the Forest Plan (§ 4.20, 4.235, and 4.144). Alternative A is in compliance with the National Forest Management Plan with regards to the following: 219.27(i)(4) protect streams-streambanks and other bodies of water; 219.27(i)(6) provide adequate habitat to maintain viable populations; 219.27 (i)(7) special attention to land and vegetation adjacent to perennial streams and other bodies of water.

### NATIONAL FOREST MANAGEMENT ACT

Consistency with the National Forest Management Act (NFMA) is clearly displayed in resource discussions found within this FES. A detailed discussion of NFMA compliance points, as outlined in the Code of Federal Regulations (CFR) 26 CFR 219.27 as published in the Federal Register is not available at this time. However, the Forest Plan provides a comprehensive discussion of NFMA, other laws, and regulations that are consistent and integrates with the Forest Plan. The information provided here is not intended to be complete, but rather an overview of the integration of NFMA with the Forest Plan.

### VEGETATIVE MANIPULATION

While the use of multiple use goals established for the area with potential environmental, biological, cultural, resource, aesthetic, engineering, and economic impacts are stated in the regional guides and forest plans—this chapter focuses on the multiple use goals of the Forest Plan.

In Chapter Four, each resource is evaluated as to how each alternative addresses multiple use goals that are inherent in the Forest Plan standards and guidelines. As described in these discussions, all action alternatives comply with the Forest Plan goals. The Forest Plan goals are a product of the Regional guides and those guides were developed specifically for the Dixie National Forest.
219.27 (4)(a) 2: “Aerose that lands can be adequately restocked as provided in paragraph (b) (3) of this section, except when permanent openings are created for wildlife habitat improvement, vistas, recreation uses and similar practices.”

No permanent openings are being created under any alternative. There are regenerative harvest treatments prescribed in some areas which provide reasonable assurances they will regenerate as described in Effects of Fire and Timber Harvesting on Vegetation (1997 Project File, exhibit 17). In the timber harvest Focus Areas, any areas requiring regeneration are a direct result of bark beetle activity and not directly caused by harvest activity. Practices are being employed in these areas that will provide reasonable assurances they too will be successfully regenerated. Reference Chapter Two and Four for disclosure of practices and expected outcomes.

219.27 (4)(b) 1: “Not be chosen primarily because they will give the greatest dollar return or the greatest output of timber, although these factors will be considered.”

While economic and output considerations were made in the decision process, other factors related to reducing the impacts of the bark beetle and protection of resources within the project area as described in Chapters Three and Four will be the primary toxins to determine the best action to implement. The reasons for the decision will be fully described in the Record of Decision.

219.27 (4)(c) 1: “Be chosen after considering the effects on residual trees and adjacent stands.”

Areas proposed for treatment under the Alternative were those most affected by the bark beetles, and/or had potential to put other stands at risk if beetle activity continues. Effects on other stands and residual trees are discussed in Chapter Final Harvesting Vegetation Actions proposed to be implemented under each alternative are believed to have most project purpose and need while meeting issues that drove alternative formulation.

219.27 (4)(d) 1: Avoid permanent impairment of site productivity and ensure conservation of soil and water resources

SWCPs, implemented in project design and contract initiation are designed to minimize impacts to site productivity and ensure conservation of soil and water resources. These are discussed in Chapter Four, Soil and Hydrology. Contract clauses will be used that implement SWCPs, such as directional felling, designated skid trails, contouring, etc.

219.27 (4)(e) 1: Provide the desired effects on water quantity and quality, wildlife and fish habitat...and other resource yields.

The analysis of the Proposed Action and Action Alternatives, show that there would be no change to water quantity as are affected watersheds. The amount of created openings is well below the 30% threshold that is believed to be needed to significantly affect water yields. Effects to water quality and fish habitat would be negligible due to implementation of the required SWCPs.

219.27 (4)(f) 1: Be practical in terms of transportation and harvesting requirements, and total cost of preparation, logging, and administration

The transportation and harvest methods described are capable of being implemented, based on the Silvicultural systems and transportation plan and feasibility report (Refer to the Project File, exhibit 16). The economic analyses outlined in Chapter Four demonstrates that all costs are well within expected revenues.

SILVICULTURAL PRACTICES

219.27 (4)(h) 1: “No timber harvesting shall occur on lands classified as not suited for timber production pursuant to 219.14 except for salvage sales. These lands shall continue to be treated for reforestation purposes if necessary to achieve the multiple use objectives of the plan.”

This has been discussed under the “Forest Land Suitability” section. Based on discussions in this section, all harvest activities proposed are in full compliance with this management requirement.

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219.27 (4)(g) 1: “The selected sale schedule provides the allowable sale quantity for the first planning period. Within the planning period, the volume of timber to be sold in any one year may exceed the annual allowable sale quantity so long as the total amount does not exceed the allowable sale quantity. Nothing in this paragraph prohibits salvage or sanitation harvesting of timber stands which are substantially damaged by fire, windthrow, or other catastrophe, or which are in imminent danger of insect or disease attack and where such harvests are consistent with silvicultural and environmental standards. Such timber may either substitute for timber that would otherwise be sold under the plan or, if not feasible, be sold over and above the planned volume.”

The volume to be sold under the Proposed Action or other Action Alternatives would contribute to the allowable sale quantity (ASQ) for the first planning period for the Forest Plan. Sale of any volume proposed under the Proposed Action or Action Alternatives would not result in exceeding the ASQ for the planning period.

219.27 (4)(h) 2: “When trees are cut to achieve timber production obj. tives, the cuttings shall be made in such a way as to assure that the knowledge and technology exists to adequately restock the lands within 5 years after final harvest. Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to be restocking...”

NFMA requires that timber be harvested from National Forest Systems lands only where there is assurance that such lands can be adequately restocked within 5 years of final harvest (16 U.S.C. 1604).

Under the Proposed Action, and other Action Alternatives, dead, dying and bark infested trees are being cut to obtain economic recovery, reduce fuel loads, accelerate reforestation, and reduce risk to bark beetle infestation in the Hancock Peak Focus Area. Only in the areas where bark beetle populations have killed substantial numbers of trees would an unstocked opening be created, and regeneration activity necessary. Regeneration in these areas is not a result of achieved timber production objectives. This may occur on areas impacted by a natural disaster (bark beetle infestation). Therefore, in the timber harvest Focus Areas, the NFMA 5 year requirement does not apply to regeneration activities proposed under the Proposed Action, or any Action Alternative. The objective of the aspen regeneration proposal is for wildlife habitat improvement which does not fall under this CFR.

In the Hancock Peak Focus Area, selected green trees would be removed to reduce future losses to the existing bark beetle populations that are in and near the project area. Removal of these trees would not result in an unstocked stand condition that would require regeneration activity.

Monitoring would be used to assess the success of regeneration efforts following project completion. Desired results and forest plan standards would be specifically stated in the detailed silvicultural prescriptions written for each area. The details of the monitoring plan are in Appendix 12.

Stands in project area requiring regeneration activity following implementation of the Proposed Action, or other Action Alternatives, WOULD be successfully regenerated in accordance with the National Forest Management Act (NFMA, 1978) requirements. Dixie National Forest monitoring of spruce plantations demonstrates a 92% certification of stocking at the 5th year (Project File, exhibit 17). Two past regeneration areas near the project area demonstrates successful planting and natural regeneration in spuce.

219.27 (4)(g) 3: "Cultural treatments such as thinning, weedc and other partial cutting may be included in the forest plan where they are intended to increase the rate of growth of r ii m ang trees. Favor commonly valuable tree species, favor species age classes which are most valuable for wildlife or achieve other multiple use objectives.

Sanitation treatments prescribed in the Proposed Action, and Action Alternatives are intended to achieve the desired density and species mix to reduce spruce beetle risk. This is outlined in the silvicultural prescription and in Chapter Four Vegetation.

219.27 (4)(h) 2: "Harvest levels based on intensified management practices shall be decreased no later than the end of each planning period of such practices cannot be completed substantially as planned.

This applies to Forest Plan level decisions, not to project level decisions.
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2.97.5(3b) Timber harvest cuts designed to regenerate an even-aged stand of timber shall be carried out in a manner consistent with the protection of soil, waterfowl, fish, wildlife, and the regulation of the timber resource.

No even-aged treatments are proposed under the Proposed Action or other Action Alternatives. However, as discussed in Chapters Three and Four, the SWCP's are designed to protect soil, water, and intrasite resources. Permanent harvest restrictions are not set within adequate ground cover, harvest restrictions are in critical soil and watershed areas, wet condition restrictions, desegregated skid trails, and ripping of skid trails.

2.97.5(3c) Timber harvest and other silvicultural treatments shall be used to prevent potential damaging populations increases of forest pests organisms. Silvicultural treatments shall not be applied where such treatments would make stands susceptible to pest caused damage levels inconsistent with management objectives.

The Purpose and Need for this action in the Hancock Peak Focus Area is driven by the need to reduce the potential damaging population increases of bark beetles. As described in Chapter Four, Vegetation, "PROCESS", the Proposed Action and Action Alternatives would move toward achieving this objective. The proposed silvicultural treatments would improve the existing situation.

**EVEN-AGED MANAGEMENT**

**OPPORTUNITIES TO CONSIDER:** The National Forest Management Act states that clearcutting is to be utilized on National Forest System lands where it is determined to be the optimum method.

Salvage/cutover and improvement cuttings are the proposed treatments in other areas under the Proposed Action. These other actions are not applicable to the timber harvest Focus Areas. Clearcutting is not applicable in Focus Areas. Some areas have been heavily impacted by spruce beetles and a portion of the dead trees would be removed. This means some stands would be left standing post-fire meeting trees per acre or dead trees on specific composition peaks due to bark beetle activity which may resemble a clearcut. Only minor amounts of non-infested trees would be removed from these areas. Damage to live trees that have survived the bark beetle infestations would be minimized by strict adherence to contract requirements for protection of residual green trees.

In the areas, regenerating areas, current literature indicates that clearcutting Aspen clones provides the best conditions for new growth and root regeneration.

**APPROPRIATENESS OF EVEN-AGED MANAGEMENT**

The National Forest Management Act (NFMA) place special requirements on the use of even-aged silvicultural systems on National Forest System lands. This is contained in NFMA 106 USC 1604(a)(1)(B) and (C) which states that "cuts designed to regenerate an even-aged stand of timber areas should be used as a cutting method only where such cutting is determined to be appropriate, to meet the objectives and requirements of relevant land management plan."

Long-term management objectives have not been established for the project area. In some areas, specific stands have or are projected to face a large proportion of the inventory, creating a more uneven-aged condition. However, a decision would still exist in the future for managing these stands for uneven-aged conditions; it would just take longer for them to achieve an uneven-aged distribution. All stands would have an option in the future to manage as even or uneven-aged depending on desired conditions at that time.

2.97.5(3m) Openings should be located to achieve the desired combination of multiple use objectives. Regional forest condition, specific goals, and the dispersion of openings. As a minimum, open areas in forest stands are no longer treated. Openings in forest stands are not large enough.

Refer to the discussion under 2.97.5(3e)(2b).

2.97.5(3n) Individual cut blocks, patches, or strips shall conform to the maximum size limits for areas to be cut in one harvest operation established by the regional guide. This limit may be less than, but will not exceed, 40 acres for all other forest types except as provided in paragraphs (d)(2)(i) through (iii) of this section. (i) - Cut openings larger than those specified may be permitted where larger units will produce a more desirable combination of net public benefits... (iii) - Size limits exceeding those established in paragraphs (d)(2)(ii) and (2)(iii) of this section are permitted on an individual timber sale basis after 60 days' notice and review by the Regional Forest... (iiiii) - The established limit shall not apply to the size of areas harvested as a result of natural catastrophic condition such as fire, insect and disease attack, or windstorm.

The Regional Guide for the Intermountain Region (1984) page 3-31, states, "An opening created in the Forest by the regional action of even-aged treatment in the Hancock Peak Focus Area that exceeds 40 acres will require Regional Forester approval. Where such openings exceed 60 acres in size to produce a more desirable combination of net public benefits, they will be subject to a 60-day public review, except where a catastrophic exists. Regional Forester review and approval is required for harvesting larger units under catastrophic conditions. Appropriate public notice will also be given... (e) Evidence of a catastrophic condition must be reviewed and approved by the Regional Forester, if created openings will exceed 60 acres.

In a letter dated January 26, 1996, Regional Forester Dale N. Bosworth granted a programmatic exemption of "regional approval of openings created by the removal of salvage of salvage timber from areas harvested as a result of catastrophic bark beetle infestations. This request was granted for the following reasons: In the past seven years the Forest has requested size of opening exemptions for several areas on a case-by-case basis. These have been denied because the situations on the District are legal under the National Forest Management Act of 1976 (NFMA) [Public Law 94-588 Section 6 (iv) and (v)] and the resulting Code of Federal Regulations of 1982 [36 CFR 291.27 (d)(2)(i) and (iii)]. In the Regional Guide, policy is set on page 3-31 (1) and (e) that "Regional Forester review and approval is required for harvesting larger units under catastrophic conditions." This administrative policy requires exemption beyond that specified in NFMA and 291.29. The Regional Guide goes on to state in paragraph (1) "The established limit will not apply to the size of area harvested as a result of natural catastrophic condition, such as fire, insect attack, or windstorm.

This programmatic exemption has been addressed in a proposed Forest-rule amendment in Chapter 1 of this FEIS and refer to Chapter Eight for a detailed discussion of the proposed amendment. Copies of the Regional Forester's letter are on file.

**Environmental Consequences**

The definition of an opening, according to the Forest Plan SAG (0103. 0107 and 0105-65 through 0107-65) Based on this SAG, for management purposes, a cut-over area is considered an opening: 1 Forest and/or香菇 production drawing below 40 percent of potential production. 2. Deer and elk hunting cover reaches 60 percent of potential. 3. Minimum stocking standards by forest cover type and type productivity are met, and. 4. The area appears as a young forest rather than a reworked opening, and takes on the appearance of the adjoining characteristic landscape.

A guide for stocking is provided by forest type, for regeneration areas and openings that have been created as result of harvest or catastrophic loss. For purposes of defining when a opening greater than 40 acres in size has resulted from the current bark beetle infestations, the following was used: (iv) 40% of the areas within a continuous black block must have 30% - less crown closure Base is - the Forest Plan criteria under the Proposed Action and Action Alternatives exclusive of the Hancock Peak Focus Area. Nearly all the stands proposed for treatment are expected to fall below 30% - crown closure. These stand would create three blocks of areas with less than 30%, crown closure that exceed 40 acres. Stands 102, 103, 104, and 177 acres; 106.7, 18.6, 32, 33, 34, 35, 36, 214 acres; 10.6, 10.1, 15, 20, (528 acres) Refer to Appendix 7 for a map showing locations of stands projected to be less than 30% crown closure.

These large openings are a direct result of the impacts created by the spruce beetle. Harvest operations proposed in these stands, would NOT cause any increase in opening size as a result of any live tree harvest.

Evidence of a widespread spruce beetle infestations in the project area is supported by a Forest Pest Management (FPM) field review and supporting documentation of field review (Refer to Project File exhibit 183) Due to bark beetle activity or natural stand growth patterns, areas with less than 30% - crown closure occur or are expected to occur without management and still meet minimum stocking requirements.
CLEAN WATER ACT

The Clean Water Act (CWA) requires each state to implement its own water quality standards. The State of Utah's Water Quality Antidegradation Policy requires maintenance of water quality to protect existing instream Beneficial Uses on streams designated as Category 1 High Quality Waters. All surface waters geographically located within the outer boundaries of the Dixie National Forest, whether on private or public lands are designated as High Quality Waters (Category 1). This means they will be maintained at existing high quality. New point sources will not be allowed, and non-point sources will be controlled to the extent feasible through implementation of Best Management Practices (BMPs) or regulatory programs (Utah Division of Water Quality 1994). The State of Utah and the Forest Service have agreed through a 1995 Memorandum of Understanding to use Forest Plan Standards & Guidelines and the Forest Service Handbook (FSHB) 2809.22 Soil and Water Conservation Practices (SWCPs) as the BMPs. The use of SWCPs as the BMPs meet the water quality protection elements of the Utah Nonpoint Source Management Plan.

The Beneficial Uses and High Quality of water in the streams draining the Project Area would be maintained during and following project implementation through the proper implementation of BMPs (SWCPs) as described in Chapter 2 (Mitigation).

EXECUTIVE ORDER 11990 OF MAY, 1977

This order requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In compliance with this order, Forest Service direction requires that an analysis be completed to determine whether adverse impacts would result.

The location of wetlands in the Project area were identified in the delineation and inventory of critical watershed areas. No ground disturbing activities will occur within 50 feet of any wetland, seep, or spring. These areas have been identified on the critical watershed map. Impacts from adjacent or nearby areas will be prevented through implementation of SWCPs as described in Chapter 2 (Mitigation). With a 50 foot buffer area around any wetlands, seeps, or springs, implementation of SWCPs, any of the alternatives would be in compliance with Executive Order 11990.

EXECUTIVE ORDER 11988 OF MAY, 1977

This order requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by flood plain areas. In compliance with this order, the Forest Service requires an analysis be completed to determine the significance of Proposed Actions in terms of impacts to flood plains.

No ground disturbing activities will be allowed within 50 feet of any stream channel (episodical, intermittent, and/or perennial), except at road crossings. Impacts related to road crossings will be minimized or prevented through implementation of SWCPs. All new roads proposed will be closed following project completion, and the natural stream courses will be reestablished. Therefore any of the proposed alternatives would be in compliance with Executive Order 11988.

ENDANGERED SPECIES ACT OF 1973, AS AMENDED

Based on discussions in Chapters Three and Four concerning threatened and endangered plant and wildlife species, correspondence with USFWS, and detailed discussions contained in the Biological Assessment located in the Project File (Exhibit 13), it has been determined that there would be no adverse effects to populations of threatened, endangered, or proposed wildlife or plant species relative to the Proposed Action or any alternative.

AMERICAN ANTIQUITIES ACT OF 1906 AND HISTORIC PRESERVATION ACT OF 1966

Based on the discussions in Chapters Three and Four concerning Heritage Resources, and Project File documentation (Exhibit 21), it has been determined that there will be no measurable effects to any Historic, Properties relative to any of the alternatives.

CLEAN AIR ACT, AS AMENDED IN 1977

Based on discussions in Chapter Three and Four concerning Air Quality, it has been determined that there would be no measurable effects to air quality in class I or II areas relative to any of the alternatives.

RELATIONSHIP BETWEEN SHORT-TERM USES/LONG-TERM PRODUCTIVITY

The relationship between the short-term uses of the environment and the maintenance and enhancement of long term productivity is complex. For this analysis, it was assumed that short term uses were those that generally occur on a yearly basis (i.e. livestock grazing as a use of the forage resource, timber harvest as a use of the available wood resource, and recreation uses). Long term refers to longer than 10 years. Productivity refers to the capability of the land to provide market and non-market outputs and values for future generations. Soil and water are the primary factors of productivity and represent the relationship between short term uses and long term productivity.

The Proposed Action as well as all other Action Alternatives studied in detail, incorporates sustained yield of resource outputs in varying types and degrees, while maintaining resource productivity. The specific design criteria and mitigation measures included in an alternative ensures that long term productivity would not be impaired by the application of short term uses. Therefore, in every alternative, the long term productivity is assured. This conclusion is based on disclosures for each resource in Chapters Three and Four.

The subsurface cultural resources (Refer to Project File, exhibit 17) and effects of the alternative implemented would be monitored to provide data to assure that standards for long term productivity would be met. Monitoring requirements and standards would apply to any Action Alternative and are included in Appendix 12.

The Proposed Action has the highest level of short term uses, as reflected by the recreation use, wildlife use, range use and wood product recovery disclosed in this document. These alternative are followed by Alternative A and B, and last would be No Action.

Short-term adverse consequences vary by alternative and the resource affected. For instance, No Action would have the greatest adverse effects to fire hazard, visual quality, and reforestation within 10 years. Proposed Action would have the greatest adverse effects to air quality within 10 years due to the higher number of acres proposed for burning. Refer to disclosures in Chapter Four, summarized in Chapter Two, Table 2.2, for detailed discussions by resource relative to these short term effects.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Irretrievable resource commitment applies to losses of production, harvest, or commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

IRRETRIEVABLE RESOURCE COMMITMENTS

VEGETATION: Where permanent roads are constructed or reconstructed and the soil displaced, there is an irretrievable loss of the type of vegetation that occurs. For temporary roads, skid trails and landings, vegetation is
restored on the disturbed areas, but the type of vegetation may be changed from timber to grasses and legumes if these areas are to be part of the permanent transportation system.

RECREATION/VISUALS Where trees are harvested there would be an irrecoverable loss of an unaltered environment from selected viewsheds in the short term (refer to Recreation/Visual sections for detailed disclosures). The time required for this condition to change would vary by the observer involved, dependent on the type of vegetation that a particular observer would require to meet their visual interest.

SOCIAL/ECONOMIC Where there is no wood fiber recovered, such as No Action, there would be an irrecoverable loss in income and employment in the local economy for a short period of time, or, until new sources of supply could be found. Refer to the Social/Economic section for detailed discussions by alternative. To compensate for a lack of supply of timber, firms reach outside their normal market area for sources of supply. This, in turn, impacts resources available to other firms, who then must reach outside their market areas. This effect would ripple through the market of the zone of influence as identified in the Social/Economic section of this Chapter.

Refer to each resource section in this Chapter for detailed disclosures of these irreversible commitments of resources.

IRRERVERSIBLE RESOURCE COMMITMENTS
Irreversible resource commitment applies primarily to the use of non-renewable resources, such as minerals or Heritage resources, or those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

Two types of irreversible resource commitments would occur as a result of implementation of any of the action alternatives:

ENERGY RESOURCES: Fossil fuels used in processing wood products which would result from an action alternative would be an irreversible loss.

OTHER RESOURCES: There would be a limited irreversible loss in soilrock resources used in road construction through use of existing and potential borrow pits.

No other irreversible resource commitments were determined as a result of the implementation of an action alternative. This would result due to the adherence to Forest Plan S&G and alternative mitigation for resources involved. Refer to detailed disclosures for each resource in Chapter Four of this document for supporting documentation of this conclusion.

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

All activities that occur as the result of the implementation of an alternative would cause some degree of environmental impact. The degree and severity of the adverse effects are monitored through the adherence to Forest Plan S&G's and alternative mitigation measures. Some impacts cannot be avoided if management activities occur regardless of the alternative implemented. These effects include:

a) Intermittent decrease in air quality due to dust from road construction, maintenance and use; and smoke due to prescribed burning activities.

b) Short term and localized increases in soil erosion due to land disturbing activities.

c) Short term changes in the landscape from silviculture and road construction that may be disturbing to some Forest visitors.

d) Short term conflicts between recreation use and timber harvest, aspen regeneration and prescribed burning.

e) Temporary wildlife disturbance in some locations because of increased human activity.

For a complete disclosure of effects to each resource, refer to the detailed disclosures for each resource found in this Chapter.

PLANS AND POLICIES OF OTHER JURISDICTIONS

As evidenced from responses to scoping, and other public involvement solicitations, no conflicts have been identified between the objectives of other Federal, State, and local governments and Indian tribes, and the Proposed Action or Action Alternatives. Not have any been identified relative to No Action.

MONITORING PLAN

Monitoring Plans, which would be part of the Proposed Action, or any Action Alternative to the Proposed Action, have been prepared. These plans include the item to be monitored, frequency of monitoring, person responsible, and projected costs. The monitoring plans are located in Appendix 12.
# CHAPTER FIVE

## LIST OF PREPARERS

### INTERDISCIPLINARY TEAM MEMBERS

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### TECHNICAL SUPPORT

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Cedar City Ranger District
 Dixie National Forest

List of Preparers

Spruce Ecosystem Recovery Project DEIS

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CHAPTER SIX

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CHAPTER SEVEN

GLOSSARY
CHAPTER SEVEN

GLOSSARY

affected environment - The natural environment that exists at the present time in an area being analyzed.

age class - An age grouping of trees according to an interval of years, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1-20 years or 21-40 years.

airshed - A geographic area that shares the same air.

allotment (range allotment) - The area designated for use by a prescribed number of livestock for a prescribed period of time. Though an entire Ranger District may be divided into allotments, all land will not be grazed, because other uses, such as recreation or tree plantings, may be more important at a given time.

anadromous fish - Species of fish that mature in the sea and migrate into streams to spawn.

aspect - The direction a slope or watershed faces. A hillside facing east has an eastern aspect.

ASQ (allowable sale quantity) - The amount of timber that may be sold within a certain time period from an area of suitable land. The suitability of the land and the time period are specified in the Forest Plan.

aquatic macroinvertebrates - Invertebrates living within aquatic systems that are large enough to be seen with the naked eye (e.g. most aquatic insects).

aquifer - A body of rock that is saturated with water or transmits water.

AUM (animal unit month) - The quantity of forage required by one mature cow and her calf (or the equivalent, in sheep or horses, for instance) for one month.

bark beetle - An insect that bores through the bark of forest trees to eat the inner bark and lay its eggs. Bark beetles are important killers of forest trees.

basal area - The area of the cross-section of a tree trunk near its base, usually 4 and 1/2 feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

big game - Large mammals, such as deer, elk, bear, and antelope that are hunted for sport.

biological diversity - The number and abundance of species found within a common environment. This includes the varieties of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.

biota - The plant and animal life of a particular region.

BMP (Best Management Practices): Practices designed to prevent or reduce water pollution. Also referred to as Soil and Water Conservation Practices (SWCPs).

board foot - A measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

broadcast burn - A prescribed fire that burns a designated area. These controlled fires can reduce wildfire hazards, improve forage for wildlife and livestock, or encourage successful regeneration of trees.

brush - Twigs, leaves, and young shoots of trees and shrubs that animals eat. Browse is often used to refer to the shrubs eaten by big game, such as elk and deer.

buffer - A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a trail could block views that may be undesirable. Buffers may be set aside next to wildlife habitat to reduce abrupt change to the habitat.

canopy - The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied forest.

canopy cover - See cover class.

capture (impact) - Some of the ways functions are described: resources (organisms, materials, and energy) brought into the system (i.e. photosynthesis, migration onto summer range, pollution brought in by wind or water).

cavity - A hole in a tree often used by wildlife species, usually birds, for nesting, roosting, and reproduction.

clear cut - A harvest in which all or almost all of the trees are removed in one cutting.

climax - The culminating stage in plant succession for a given site. Climax vegetation is stable, self-maintaining, and self-reproducing.

collector roads - These roads serve small land areas and are usually connected to a Forest System Road, a county road, or a state highway.

common (Class B) landscape - Areas where features contain variety in form, line, color, and texture or combinations thereof, but which tend to be common throughout the character type and are not outstanding in visual quality.

composition - What an ecosystem is composed of. Composition could include water, minerals, trees, snags, wildlife, soil, microorganisms, and certain plant species.

conifer - A tree that produces cones, such as a pine, spruce, or fir tree.

connectivity - The linkage of similar but separated vegetation stands by patches, corridors, or "stepping stones" of like vegetation. This term can also refer to the degree to which similar vegetation are linked.

contour - A line drawn on a map connecting points of the same elevation.

corridor - Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and herbaceous vegetation between meadows where wildlife feed.

cover - Any feature that protects or conserves wildlife or fish from view or elements. Cover may be dead or live vegetation, boulders, or undercut streambanks. Animals use cover to escape from predators, reproduce, rest, or feed.

cover class - Represents a percentage range for a fixed area covered by the crowns of plants. It is measured as a vertical projection of the outermost portion of the foliage. Cover class A = <40% canopy cover, cover class B = 40-60% canopy cover, cover class C = 60-80% canopy cover, cover class D = >80% canopy cover.

cover type (forest cover type) - Stands of a particular vegetation type that are composed of similar species. The aspen cover type contains plants distinct from the pinyon-juniper cover type.

created opening - An opening in the forest created by the application of even-aged silvicultural practices.

critical habitat - Areas designated by the U.S. Fish and Wildlife Service for the survival and recovery of Federally listed threatened or endangered species.
crown closure - see cover class.

crown height - The distance from the ground to the base of the crown of a tree.

cultural resource - The remains of sites, structures, or objects used by people in the past; this can be historical or prehistoric.

cumulative effects - Effects on the environment that result from separate, individual actions that, collectively, become significant over time.

cycling - One of the ways functions are described; resources which are transported within the system (i.e. animal migration, nutrient cycling in a forest stand, snow melt becoming part of the surface or groundwater flows).

dbh (diameter at breast height) - The diameter of a tree 4 and 1/2 feet above the ground on the uphill side of the tree.

decision criteria - The rules and standards used to evaluate alternatives to a proposed action on National Forest land. Decision criteria are designed to help a decision maker identify a preferred choice from the array of alternatives.

development - Draft Environmental Impact Statement - The draft version of the Environmental Impact Statement that is released to the public and other agencies for review and comment.

desired future condition - Land or resource conditions that are expected to result if goals and objectives are fully achieved.

developed recreation - Recreation that requires facilities that, in turn, result in concentrated use of the area. For example, skiing requires ski lifts, parking lots, buildings, and roads. Campgrounds require roads, picnic tables, and toilet facilities.

dispersed recreation - Recreation that does not occur in a developed recreation site, such as hunting, backpacking, and scenic driving.

distinctive (Class A) landscape - Areas where features of landforms, vegetative patterns, water forms, and rock formations are of unusual or outstanding visual quality.

disturbance - Any event such as forest fire or insect infestations that alter the structure, composition, or functions of an ecosystem. Disturbance can also mean disruption to an animal’s behavior or well being.

diversity - The interrelationships of living things to one another and to their environment, or the study of these interrelationships.

ecosystem - An arrangement of living and non-living things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildlife are two of the forces that act within ecosystems.

ecosystem management - An ecological approach to natural resource management to assure productive, healthy ecosystems by blending social, economic, physical, and biological needs and values.

ecoregion - A population of a species in a given ecosystem that is adapted to a particular set of environmental conditions.

effect - The increased richness of plants and animals resulting from the mixing of two communities where they join.

element of ecosystems - An identifiable component, process, or condition of an ecosystem.

endangered species - A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

endemic plant/organism - A plant or animal that occurs naturally in a certain region and whose distribution is relatively limited geographically.

environmental analysis - An analysis of alternative actions and their predictable long and short-term environmental effects. Environmental analyses include physical, biological, social, and economic factors.

environmental assessment - A brief version of an Environmental Impact Statement. (See Environmental Impact Statement.)

Environmental Impact Statement - A statement of environmental effects of a proposed action and alternatives to it. The EIS is released to other agencies and the public for comment and review.

ephemeral streams - Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow.

erosion - The wearing away of the land surface by wind or water.

even aged management - Timber management actions that result in the creation of stands of trees in which the trees are essentially the same age.

exudation - A flow or a drip of fluid from a living organism.

fear - A state of anxiety or other emotional state characterized by fear, alarm, or distress.

fear management - The use of fear to control or influence behavior.

feeling - That which is the state of mind which results from the awareness of the presence of stimuli.

felling - Cutting down trees.

fire regime - The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

fisheries habitat - Streams, lakes, and reservoirs that support fish, or have the potential to support fish.

flood plain - A lowland adjoining a watercourse. At a minimum, the area is subject to a 1% or greater chance of flooding in a given year.

flora - The plant life of a given area.

forage - All browse and non-woody plants that are eaten by wildlife and livestock.

forb - A broadleaf plant that has little or no woody material in it.

foreground - The part of a scene or landscape that is nearest to the viewer.

forest cover type - See cover type.

Forest Vegetation Simulation - A computer model for timber growth and yield. It projects per acre growth and volume yield for commercial timber stands. Formerly known as "Progams".

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forest health - A measure of the robustness of forest ecosystems. Aspects of forest health include biological diversity, soil, air, and water productivity; natural disturbances; and the capacity of the forest to provide a sustaining flow of goods and services for people.

Forest Roads and Trails - Roads and trails under the jurisdiction of the Forest Service.

Forest Supervisor - The official responsible for administering National Forest lands on an administrative unit, usually one or more National Forests. The Forest Supervisor reports to the Region, Forester.

fragmentation - The splitting or isolating of patches of similar habitat, typically forest cover, but including other types of habitat. Habitat can be fragmented naturally or from forest management activities, such as clearcut logging.

fuels - Plants and woody vegetation, both living and dead, that are capable of burning.

fuels management - The treatment of fuels that would otherwise interfere with effective fire management or control. For instance, prescribed fire can reduce the amount of fuels that accumulate on the forest floor before the fuels become so heavy that a natural wildfire in the area would be explosive and impossible to control.

fuelfood - Wood cut into short lengths for burning.

function - All the processes within an ecosystem through which the elements interact, such as succession, the food chain, fire, weather, and the hydrologic cycle.

game species - Any species of wildlife or fish that is hunted or harvested according to prescribed limits and seasons.

geomorphic processes - Processes that change the character and form of the earth's surface such as volcanic activity, running water, and glacial action.

GIS (geographic information systems): GIS is both a database designed to handle geographic data as well as a set of computer operations that can be used to analyze the data. In a sense, GIS can be thought of as a higher order map.

ground fire - A fire that burns along the forest floor and does not affect trees with thick bark or high crowns.

habitat - The area where a plant or animal lives and grows under natural conditions.

habitat type - A way to classify land area. A habitat type can support certain climax vegetation, both tree and undergrowth species. Habitat typing can indicate the biological potential of a site.

hiding cover - Vegetation capable of hiding 90% of an adult elk or deer from human's view at a distance of 200 feet or less.

hydrology - The science of water distribution and movement in the earth, on the surface, and in the atmosphere.

igneous rock - Rocks formed when high temperature, molten mineral matter cooled and solidified.

indicator species - A plant or animal species related to a particular kind of environment. Its presence indicates that specific habitat conditions are also present. (See also MIS.)

integrated pest management - IPM evaluates alternatives for managing forest pest populations, based on consideration of pest-host relationships.

interdisciplinary team - A team of individuals with skills from different disciplines that focuses on the same task or project.

intermittent stream - A stream that only flows during wet periods of the year (spring and early summer).

irretrievable - One of the categories of impacts mentioned in the National Environmental Policy Act to be included in statements of environmental impacts. An irretrievable effect applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is irretrievably lost. If the ski area closes, timber production could resume; the loss of timber production during the time that the area was devoted to winter sports is irretrievable. However, the loss of timber production during that time is not irretrievable, because it is possible for timber production to resume if the area is no longer used as a ski area.

irreversible - A category of impacts mentioned in statements of environmental impacts that applies to non-renewable resources, such as minerals and archaeological sites. Irreversible effects can also refer to effects of actions that can be renewed only after a very long period of time, such as the loss of soil productivity.

ladder fuels - Vegetation located below the crown level of forest trees which can carry fire from the forest floor to tree crowns. Ladder fuels may be low-growing tree branches, shrubs, or smaller trees.

landing - Any place where cut timber is assembled for further transport from the timber sale area.

landscape - A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts. Landscapes are often used for coarse grain analyses.

litter (forest litter) - The freshly fallen or only slightly decomposed plant material on the forest floor. This layer includes foliage, bark fragments, twigs, flowers, and fruit.

logging residue (slash) - The residue left on the ground after timber cutting. It includes unused logs, uprooted stumps, broken branches, bark, and leaves. Certain amounts of slash provide important ecosystem roles, such as soil protection, nutrient cycling, and wildlife habitat.

long-term - Unless otherwise defined, long-term refers to longer than 10 years.

M - Thousand. Five thousand board feet of timber can be expressed as 5M board feet.

mass movement/wasting - The downslope movement of large masses of earth material by the force of gravity. Also called a landslide.

MBF - Thousand Board Feet (See board feet )

microclimate - The climate of a small site. It may differ from the climate at large of the area due to aspect, tree cover or absence of tree cover, or exposure to winds.

middleground - A term used the management of visual resources, or scenery. It refers to the visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand.

mineral soil - Soil that consists mainly of inorganic material, such as weathered rock, rather than organic matter.

MIS (management indicator species) - A wildlife species whose population will indicate the health of the ecosystem in which it lives and, consequently, the effects of forest management activities to that ecosystem. MIS species are selected by land management agencies. (See indicator species )

mitigation - Actions taken to avoid, minimize, or rectify the impact of a land management practice.

mixed stand - A stand consisting of two or more tree species.

MBMF - Million Board Feet (See board feet )
modification - A visual quality objective; management activities may visually dominate the original, characteristic landscape, but they must borrow from naturally established form, line, color, or texture so that the activity blends with the surrounding area.

monitoring and evaluation - The periodic evaluation of forest management activities to determine how well objectives were met and how management practices should be adjusted. See "adaptive management."

mortality - Trees that were merchantable and have died within a specified period of time. The term mortality can also refer to the rate of death of a species in a given population or community.

mosaic - Areas with a variety of plant communities over a landscape, such as areas with trees and areas without trees occurring over a landscape.

natural barrier - A natural feature, such as a lava flow, road or mountain range, that will restrict animal travel or spread of a plant population.

natural disturbance - See disturbance.

natural range of variability - See range of variability.

natural resource - A feature of the natural environment that is of value to serving human needs.

NEPA (National Environmental Policy Act) - Congress passed NEPA in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public lands. Section 102 of NEPA requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

NFLRMP (National Forest Land and Resource Management Plan) - Also called the Forest Plan or just the Plan, this document guides the management of a particular National Forest and establishes management standards and guidelines for all lands of that National Forest.

NFMA (National Forest Management Act) - This law was passed in 1976 and requires the preparation of Regional Guides and Forest Plans.

No Action alternative - The most likely condition expected to exist in the future if management practices continue unchanged.

nongame - Wildlife species that are not hunted with prescribed seasons for sport.

nonpoint source pollution - Pollution whose source is not specific in location. The sources of the discharge are dispersed, not well defined, or constant. Runoff and snowmelt often make this type of pollution worse. Examples include sediments from logging activities and runoff from agricultural chemicals.

nonrenewable resource - A resource whose total quantity does not increase measurably over time, so that each use of the resource diminishes the supply.

notice of intent - A notice in the federal register of intent to prepare an environmental impact statement on a proposed action.

old growth - Old forests often containing several canopy layers, variety in tree sizes and species, decadent old trees, and standing and dead woody material.

opening - An opening in the forest created by even-aged silvicultural practices.

ORV - Off-road vehicles, such as motor cycles, 4-wheel drive vehicles, and 4-wheelers. May also be called OHV (off-highway vehicle).

overstory - The upper canopy layer; the plants below comprise the understory.

parent material - The mineral or organic matter from which the upper layers of soil are formed.

park like structure - Stands with large scattered trees and open growing conditions, usually maintained by ground fires.

partial retention - A visual quality objective which, in general, means human activities may be evident, but must remain subordinate to the characteristic landscape.

patch - An area of homogeneous vegetation, in structure and composition.

patch cut - A clearcut that creates small openings in a stand of trees, usually between 15 and 40 acres in size. On the Dixie National Forest and elsewhere, patch cuts are used to provide the disturbance needed to regenerate aspen.

percolation - Downward flow or infiltration of water through the pores or spaces of rock or soil.

perennial stream - A stream that flows throughout the year.

permitted grazing - Grazing on a National Forest range allotment under the terms of a grazing permit.

personal use - The use of a forest product, such as firewood, for home use and not for commercial use.

persons-at-one-time (PAOT) - A recreation capacity measurement term indicating the number of people who can use a facility or area at one time.

planning area - The area of National Forest land covered by a Regional Guide or Forest Plan.

planning period - The 50 year time frame for which goods, services, and effects were projected in the development of the Forest Plan.

pole/zing - The stage of forest succession in which trees are between 3 and 7 inches in diameter and are the dominant vegetation.

pole timber - Trees at least 5 inches in diameter, but smaller than the minimum size for sawtimber.

PNV - See present net value.

precommercial thinning - Removing some of the trees from a stand that are too small to be sold for lumber or house logs, so the remaining trees will grow faster.

predator - An animal that lives by preying on other animals. Predators are at or near the tops of food chains.

prescribed fire - Fire set intentionally in wildland fuels under prescribed conditions and circumstances. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

prescription - Management practices selected to accomplish specific land and resource management objectives.

present net value (PNV), also called present net worth - The measure of the economic value of a project when costs and revenues occur in different time periods. Future revenues and costs are "discounted" to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable than dollars in the future. PNV is used to compare project alternatives that have different cost and revenue flows.
production - one of the ways functions are described; resources which are "manufactured" within the system (i.e. plant growth, animal reproduction, snags falling and becoming down woody material).

productive - The ability of an area to sustain ecological values and to provide goods and services.

public land - Land for which title and control rests with a government—Federal, state, regional, county, or municipal.

public involvement - The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making.

range - Land on which the principle natural plant cover is comprised of native grasses, forbs, and shrubs that are valuable as forage for livestock and big game.

range management - The art and science of planning and directing range use intended to yield the sustained maximum annual production and perpetuation of the natural resources.

range of variability (Also called the historic range of variability or natural range of variation.) - The components of healthy ecosystems fluctuate over time. An ecosystem within its historic range of variability is resilient to natural and man-caused disturbances. The range of sustainable conditions in an ecosystem is determined by time, processes such as fire, native species, and the land itself. For instance, ecosystems that have a 10 year fire cycle have a narrower range of variation than ecosystems with 200-300 year fire cycle. Past management has placed some ecosystems outside their range of variability. Future management should move such ecosystems back toward their natural, sustainable range of variation.

Ranger District - The administrative sub-unit of a National Forest that is supervised by a District Ranger who reports directly to the Forest Supervisor.

raptor - A bird of prey, such as a eagle, owl, or hawk.

RARE II - Roadless Area Review and Evaluation. The national inventory of roadless and undeveloped areas within the National Forests and Grasslands.

recharge - The addition of water to ground water by natural or artificial processes.

recreation visitor days (RVD) - Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

reforestation - The restocking of an area with forest trees, by either natural or artificial means, such as planting.

regeneration - The renewal of a tree crop by either natural or artificial means. The term is also used to refer to the young crop itself.

Regional Forester - The official of the USDA Forest Service responsible for administering an entire region of the Forest Service.

residual stand - The trees remaining standing after an event such as selection cutting.

resilience - The ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.

Responsible official - The Forest Service employee who has been delegated the authority to carry out a specific planning action.

restoration (of ecosystems) - Actions taken to modify an ecosystem to achieve a desired, healthy, and functioning condition.

sanitation harvest - The harvest of dead, damaged or susceptible trees done primarily to prevent the spread of pests or disease and to promote forest health.

sapling - A loose term for a young tree more than a few feet tall and an inch or so in diameter that is typically growing vigorously.

sawtimber - Trees that are 9 inches in diameter at breast height or larger that can be made into lumber.

scale - In ecosystem management, it refers to the degree of resolution at which ecosystems are observed and measured.

scoping - The ongoing process to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process. It may involve public meetings, telephone conversations, or letters.

second growth - Forest growth that was established after some kind of interference with the previous forest crop, such as cutting, fire, or insect attack.

sensitive species - Plant or animal species which are susceptible to habitat changes or impacts from activities. The official designation is made by the USDA Forest Service at the Regional level and is not part of the designation of Threatened or Endangered Species made by the US Fish and Wildlife Service under the Endangered Species Act.

seral - The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.

shelterwood - A cutting method used in a more or less mature stand, designed to establish a new crop under the protection of the old.

short-term - Unless otherwise defined, short-term refers to less than 10 years.

spruce - A coniferous tree with a columnar habit and needle-like leaves

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silvicultural system - The cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

silviculture - The art and science that promotes the growth of single trees and the forest as a biological unit.

site preparation - The general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation. Naturally occurring wildfire, as well as prescribed fire can prepare a site for natural regeneration.

size class - One of the three intervals of tree stem diameters used to classify timber in the Forest Plan database. The size classes are: Seedling/Sapling (less than 5 inches in diameter); Pole Timber (5 to 7 inches in diameter); Sawtimber (greater than 7 inches in diameter)

skidding - Hauling logs by sliding, not on wheels, from stump to a collection point.

skid trail - narrow path on which logging equipment travel when moving logs from the forest to a designated landing location.

skier days - Twelve skier hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

skyline logging - A logging system used to remove timber from steep slopes. Logs are brought up-slope on a suspended cable, or skyline. Since the weight of the log is completely or partially supported by the cable, there is little disturbance to soil or other vegetation.

slash - The residue left on the ground after timber cutting or left after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

slump - A landslide where the underlying rock masses tilt back as they slide from a cliff or escarpment.

snag - A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

soil compaction - The reduction of soil volume. For instance, the weight of heavy equipment on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

soil productivity - The capacity of a soil to produce a specific crop. Productivity depends on adequate moisture and soil nutrients, as well as favorable climate.

special use permit - A permit issued to an individual or group by the USDA Forest Service for use of National Forest land for a special purpose. Examples might be a Boy Scout Jamboree or a mountain bike race.

stand - A group of trees that occupies a specific area and is similar in species, age, and condition.

standards and guidelines - Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

stocking level - The number of tree in an area as compared to the desirable number of trees for best results, such as maximum wood production.

stringer - A strip of vegetation different from surrounding vegetation, such as a stringer of aspen in a area of spruce.

structure - How the parts of ecosystems are arranged, both horizontally and vertically. These parts include vegetation patches, edge, fragmentation, canopy layers, snags, down wood, steep canyons, rocks in streams, and roads. For example, structure might reveal a pattern, or mosaic, or total randomness of vegetation.

suitability - The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.
successional stage - A stage of development of a plant community as it moves from bare ground to climax. The grass-forb stage of succession precedes the woody shrub stage.

succession - The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.

sustainability - The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

sustainable - The yield of a natural resource that can be produced continually at a given intensity of management is said to be sustainable.

sustainable yield - The yield that a renewable resource can produce continuously at a given intensity of management.

Soil and Water Conservation Practices (SWCPs) - Refer to BMPs.

target - A Natural Forest's annual goals for accomplishment for natural resource programs. Targets represent the commitment the Forest Service has with Congress to accomplish the work Congress has funded, and are often used as a measure of the agency's performance.

thermal cover - Cover used by animals against weather. For elk, thermal cover can be found in a stand of coniferous trees at least 40 feet tall with a crown closure of at least 70%.

thinning - A cutting made in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees.

threatened species - Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

tractor logging - A logging method that uses tractors to carry or drag logs from the stump to a collection point.

treatment area - The site-specific location of a resource improvement activity.

understory - The trees and woody shrubs growing beneath the overstory in a stand of trees.

uneven-aged management - Actions that maintain a forest or stand of trees composed of intermingling trees that differ markedly in age. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

unsuitable lands - Forest land that is not managed for timber production. Reasons may be matters of policy, ecology, technology, subsurface, or economics.

vegetation management - Activities designed primarily to promote the health of forest vegetation for multiple-use purposes.

vegetation type - A plant community with distinguishable characteristics.

vegetative structural stage - A method of describing the growth stages of a stand of living trees. It is based on tree size (DBH), diameter at breast height, and total canopy cover. The stages are: Grass/forb/shrub (VSS 1) = 0-1 inch DBH, Seedling/stage (VSS 2) = 1-5 inches DBH, Young Forest (VSS 3) = 5-12 inches DBH, Mid-Aged Forest (VSS 4) = 12-18 inches DBH, Mature Forest (VSS 5) = 18-24 inches DBH, Old Forest (VSS 6) = 24+ inches DBH.

vertical diversity - The diversity in a stand that results from the different layers or tiers of vegetation. It is a measure of structure.

visible population - The number of individuals of a species sufficient necessary to ensure the long-term existence of the species in natural, self-sustaining populations, adequately distributed throughout its range.

visual quality objective - A set of measurable goals for the management of forest visual resources used to measure the amount of visual contrast with the natural landscape caused by human activities.

visual resource - A part of the landscape important for its scenic quality. It may include a composite of terrain, geologic features, or vegetation.

watershed - The entire region drained by a waterway (or into a lake or reservoir). More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at that point.

water table - The upper surface of groundwater. Below it, the soil is saturated with water.

water yield - The runoff from a watershed, including groundwater outflow.

wetlands - Areas that are permanently wet or are intermittently covered with water.

wilderness (Wilderness Area) - Undeveloped federal land retaining its primeval character, without permanent human habitation or improvements. It is protected and managed to preserve its natural condition. Wilderness Areas are designated by Congress.

wildfire - Any wildland fire that is not a prescribed fire.

windthrow - Trees uprooted by wind.

yarding - Moving the cut trees from where they fell to a centralized place (landings) for haulage away from the stand.

ZOI (Zone of Influence) - The area influenced by Forest Service management activities.
CHAPTER EIGHT

PROPOSED FOREST PLAN AMENDMENT

A Forest Plan Amendment is also proposed. This amendment is proposed for the purpose of clarifying "Opening Size", public review, and Regional Forester approval when responding to catastrophic events, such as windstorms, fire, insects and disease.

BACKGROUND

On January 8, 1996, Forest Supervisor Hugh C. Thompson sent a letter to Regional Forester Dale N. Bosworth requesting "elimination of the need for the Forest to seek Regional approval of openings created by the removal of salvage timber from areas harvested as a result of catastrophic conditions [bark beetle infestations]. . . The basis for requesting this exemption stems from review of CFR regulations (CFR 219.27 (d) (2) (i) and (ii) which describe the limitation and requirements for openings created as a result of the application of even-aged silviculture, and monitoring of bark recovery projects. It is to be noted that paragraph (ii) of the CFR regulations specifically exempts size limitations on areas affected by insect and disease attack. Decisions to implement recovery activities on bark beetle infestation areas on the Dixie National Forest, as certified by monitoring of implementation activities, demonstrate the Forest is not applying even-aged silvicultural treatments in its sanitation salvage prescriptions, and the openings being created are not the result of even-age management."

In a letter dated January 26, 1996, Regional Forester Dale N. Bosworth granted a programmatic exemption of Regional approval of openings created by the removal of salvage timber from areas harvested as a result of catastrophic bark beetle infestations. This request was granted for the following reasons: "In the past several years the Forest has requested size of opening exemptions for several areas on a case-by-case basis. These have been granted, largely because the situations on the Dixie are legal under the National Forest Management Act of 1976 (NFMA) [Public Law 94-588 Section 6 (iv) and (v)] and the resulting Code of Federal Regulations of 1982 [CFR 219.27 (d) (2) (i) and (ii)]. In the Regional Guide, policy is set on page 3-21 (1) and (e) that "Regional Forester review and approval is required for harvesting larger units under catastrophic condition must be reviewed and approved by the Regional Forester, if created openings exceed 60 acres."

This administrative policy requirement is beyond that specified in NFMA and CFR 219. The Regional Guide goes on to state in paragraph (f) "The established limit will not apply to the size of area harvested as a result of natural catastrophic condition, such as fire, insect attack, or windstorms."

Regional Forester Bosworth goes on to say in this letter that "We remain aware that the definition of "opening" contained in the Dixie National Forest Plan is more inclusive than that in NFMA. The Forest should address this issue and amend the Forest Plan on a case by case basis or perhaps through a forest-wide amendment to the Forest Plan that allows an exemption to the opening definition for catastrophic situations."

PROPOSED FOREST-WIDE PLAN AMENDMENT

Proposed changes to the Dixie National Forest Plan Management Direction and Standards and Guidelines relative to the opening definition for catastrophic situations. The effects of this change in management direction and in Forest Plan Standards and Guides will be detailed each time these new standards are implemented.

The following changes are proposed to general direction E03, 06 and 07, section 6(a), (b) and (c) found on page IV-40 of the Forest Plan. Replace the existing E03, 06, and 07, section 6(a), (b) and (c) with the following:

Spruce Ecosystem Recovery Project FEIS

8-1
CHAPTER NINE
RESPONSES TO COMMENTS TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

GENERAL DIRECTION

6. The maximum size of openings created by the application of clearcut even-aged silvicultural treatments will be 40 acres regardless of forest cover type. A proposal for larger openings created by the application of clearcut even-aged silvicultural treatment are subject to a 60-day public review and require approval by the Regional Forester as specified in the Regional Guide of 1984. Exceptions to this are:

(a) Larger openings, which are the result of natural catastrophic events such as fire, insect or disease events and windstorms. These larger openings may be commercially salvaged in blocks larger than 60 acres without requirement for 60-day public review and approval by the Regional Forester. This does not preclude public notification and participation requirements as outlined under the National Environmental Policy Act (NEPA).

(b) The area does not meet the definition of a created opening.

The effects of the new management direction and Forest Plan Standards and Guidelines will be analyzed each time these new standards are applied. The changes are shown on Table 8-1.

Table 8-1. Proposed changes to Standards and Guidelines.

<table>
<thead>
<tr>
<th>STANDARD AND GUIDELINE</th>
<th>SIZE OF OPENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patch Clearcuts</td>
<td>1-10 acres (No change)</td>
</tr>
<tr>
<td>Clearcuts</td>
<td>10-40 acres (No change)</td>
</tr>
<tr>
<td>Salvage/Salvage (for catastrophic events)</td>
<td>No acre limitation (Change)</td>
</tr>
</tbody>
</table>
CHAPTER NINE

RESPONSES TO COMMENTS TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION
This Chapter responds to the comments received during the comment period of the Spruce Ecosystem Recovery Project (SERP) Draft Environmental Impact Statement (DEIS). The objective of the public comment period for the DEIS is to use the comments to improve the environmental analysis. An analysis of the public comments identifies public opinions and values relative to the project, new information about resources, geographic areas, alternatives, or even new issues.

On September 12, 1997 the DEIS was sent to members of the public who had commented during scoping on the project, affected or cooperating agencies, and elected officials. Fifteen written comments were received from individuals, groups, and agencies. A list of respondents is found on page 34 of this Chapter and the letters submitted are listed in the chronological order that they were received by the Ranger District. The letter numbers listed below correspond to that list.

Comments were received from the United States Environmental Protection Agency (EPA) and the State of Utah Division of Wildlife Resources (UDWR). The EPA gave the DEIS a rating of LO-Lack of Objections which is the highest rating given. The definition of this rating is: "The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal." The UDWR "supports the USFS’s proposed action...within the SERP area. We feel the USFS has evaluated and addressed effects of the proposed activities on wildlife very well..."

The letters were reviewed and 83 separate comments were identified in 15 categories and are all addressed individually. Unless cited as additional analysis, the responses to the comments explain or clarify the management practices that are questioned or disputed. Many of the comments received are addressed in various resource white papers (hereafter called Effects White Papers) and the watershed assessment that were incorporated by reference (FEIS 1-8) and were cited throughout the DEIS. These documents were available for review upon request during the comment period. We received no requests for these documents during the comment period. The following responses to the comments clarify or explain the information disclosed in the DEIS. Effects White Papers, and the watershed assessment and to identify any errors corrected or other changes made to the FEIS.

Multiple Resource

Letter # 1

1. Comment: "The roads that are constructed and reconstructed, regardless of whether they are closed, will contribute to sediment runoff, erosion, wildlife habitat fragmentation, loss of semi-primitive recreational opportunities, water quality problems, and other adverse impacts associated with road construction, regardless of Dixie’s attempts at closure...not until the roads are effectively annhilated, that is, completely revegetated to a point where they are no longer visible, can the Dixie claim that they do not contribute to increased road density. The EIS should reflect this point." (page 14)

Response: Road densities displayed in the EIS were determined by the miles of open roads which include all the Forest Development Roads (FDR). FDR’s are recognized by the Forest as necessary for access management. These roads are also called “system” roads and are shown on the Forest’s transportation plan map.

Closed and open roads affect many resources. The degree of effect varies temporally and spatially by resource. As described in the Wildlife Effects White Paper (Project File, Exhibit 37), the 10 percent guideline was established to define a habitat effectiveness threshold for big game (elk and deer) and is based on open roads. The effects of the proposed road construction on affected resources is described in Chapter Four of the FEIS.

As shown on page 4-34 the proposed road construction will occur in watersheds (Clear and Center Creeks) that are well below the 2.0 miles per square mile threshold. See the Response to Comment #10 below for a discussion on road densities upon implementation of the Proposed Action.

The effects to semi-primitive non-motorized recreational opportunities are discussed in the FEIS on pages 4-16 and 4-17.

Comment 2: “Spruces lies in the headwaters of the Clear Creek Watershed...The EIS states that Clear Creek watershed is at a low risk of cumulative watershed impacts, but states that they have no information on current conditions of stream channels and associated riparian areas within the watershed. How can the EIS conclude that Clear Creek is at low risk of impact, if no information exists on current conditions?...Please explain in greater clarity how the Dixie can determine there will be a low risk of cumulative impacts when they have no information on current conditions, no specification of how much timber will come off, no assurance that new road construction will not contribute to water quality problems because of illegal OHV use, and no determination of whether aspen treatments will be clearingcut and will involve tractor skidding.” (pages 14-15)

Response: The cumulative effects model (risk model) used in the analysis is described on page 4-33 of the FEIS. The model only addresses watershed variables that have the potential to directly affect stream channels. The portion of the model used in the analysis does not incorporate data from stream channels. The risk level (low, moderate, or high) is a simple calculation of watershed condition rating, and does not include stream channels directly. However, based on the visual observations of the District Hydrologist, Clear Creek itself appears to be in stable condition.
The current conditions of the Clear Creek watershed are described on pages 4-34 to 4-36 of the FEIS. The amount of timber to be harvested is expressed in treatment acres rather than volume estimates. In salvage harvest situations, the treatment acres are more useful in hydrologic analyses to estimate the amount of ground disturbance associated with skidding. The proposed treatment acres in the Clear Creek watershed for the Proposed Action and Alternative B are on pages 4-35 and 4-42 of the FEIS.

The potential effects of the road construction on water quality within the Clear Creek watershed were addressed based on the assumption that the road would be effectively closed following project completion. Whether aspen stands are burned or clearcut, appropriate steps (FEIS page 2-4 and Appendix 5) are to be taken to ensure the protection of soil and water resources. Clearcut, applicable SWCPs will be implemented to minimize surface runoff and erosion. If the stands are to be burned, soil and water protection will be incorporated into the prescription through consultation with the District Hydrologist. See comment #6 for a description of aspen regeneration methods.

Comment 3: "We are concerned about the potential for the Forest Service to circumvent a complete analysis of cumulative effects to the area by permitting incremental roadless area entries. The cumulative effects of the proposed SERP site must be examined as a whole with other potential sales, and other sales that may have adversely affected the Spruces Roadless Area." (page 5)

Comment 4: "...we request that the Forest Service provide the public with a full description of the roadless areas impacted, the specific wildlife, recreation, wilderness and esthetic values of the area, and a detailed assessment to how these values will be impacted." (page 5)

Response: The cumulative effects of past, present, and foreseeable future actions on the undeveloped areas are discussed in Chapter Four of the FEIS.

Comment 5: "We believe the dominance of timber over other uses in the mandated multiple use component has resulted in increased risk of the forest to insect and disease. This loss of visual quality, recreational value, reduced wildlife habitat and damage to soils has resulted in degradation of the DNFR," (page 7)

Response: The Dixie National Forest has been managed to be in compliance with the current Land and Resource Management Plan (1986) and the previous unit plans prior to the National Forest Management Act. The analysis of the cumulative effects of past management activities on scenic resources, including timber harvest, is described in the FEIS 4-22 through 4-30.

Comment 6: "The DEIS is particularly vague in describing silvicultural treatment...it is impossible to provide input to plan and animal communities when specifics of a proposed action are neither formulated or communicated. Of particular concern is the lack of specificity regarding aspen treatments. We cannot deduce from the document what areas will be burned and what areas will be clearcut. The impacts on water quality, wildlife, and other resources greatly differ according to silvicultural treatment." (page 2)

Response: The purpose of the project is to improve forest health and ecosystem function from the effects of the spruce beetle epidemic and past fire suppression efforts, while recovering valuable wood products. Although economic recovery by logging of beetle killed trees is one of the primary objectives of the proposal, it is only one of the management activities proposed to attain the desired conditions in the spruce ecosystem (FEIS page 1-4 and 1-5).

The estimates of the volume of wood proposed to be removed by logging is about 3,600,000 cubic feet or 18,700,000 board feet. The volume estimates by alternative are included in Table 2-2 (page 2-10) of the FEIS. The primary silvicultural treatment in the conifer areas is salvage as described on pages 1-5, 2-12, 2-13, and 2-14 by Focus Area. The Salvage Prescription (Exhibit 18, doc. 1) and the Vegetation Effects White Paper (Exhibit 37, doc. 1) describe the harvest treatments in detail. Exclusive of the Social/Economic resource, the effects of timber harvest on affected resources is based primarily on the number of treatment acres disturbed in the amount of timber removed. The effects of the harvest treatments to the resources are described in the Effects White Papers in the Project File and Chapter Four of the FEIS. A clarification of aspen treatments is described in the response to comment #6 below. There will not be four square miles of clearcuts because the acres proposed for treatment are not contiguous but are juxtaposed over a large forested area. The timber sales were designed to minimize effects to resources and to address concerns identified during internal and public scoping. The number of acres proposed for harvest (2,872) constitutes about eight percent of the forested area within the SERP area (37,577). Given the level of bark beetle mortality, some areas will appear as openings following timber harvest and are located in the sites identified on page 4-85 of the FEIS. As described in the FEIS, the silvicultural prescription is not clearcut but primarily salvage. Under the salvage prescription clumps of snags and live trees, where present, will be maintained to provide structure and recruitment of downed woody material throughout the treatment areas. The residual dead and live stand will average between 10-40 basal area per acre.

Comment 7: "We believe the dominance of timber over other uses reduces the mandated multiple use component has resulted in increased risk of the forest to insect and disease. Thus loss of visual quality, recreational value, reduced wildlife habitat and damage to soils has resulted in degradation of the DNFR." (page 1)

Response: The Dixie National Forest has been managed to be in compliance with the current Land and Resource Management Plan (1986) and the previous unit plans prior to the National Forest Management Act. The analysis of the cumulative effects of past management activities on scenic resources, including timber harvest, is described in the FEIS 4-22 through 4-30.
Maintaining a diverse forest structure and increasing diversity will reduce forest susceptibility to catastrophic events such as bark beetle epidemics rather than increase them.

Page 4-31 of the FEIS describes cumulative impacts of management activities on soils relative to thresholds.

Comment 6: "Please include a discussion of what aspen treatments will be implemented, whether they will be clearcutting or burning, and where those specific treatments will occur, in the final EIS, as well as a discussion of environmental impacts expected from each aspen treatment." (page 3)

"The Forest Service, however, neglects to explain the details of where and by what technique proposed aspen "treatments" will be implemented, fails to contrast the impacts of clearcutting versus burning as a means to regenerate this disturbance-dependent species, and fails to adequately address the project area's deficiency in old-growth aspen or acknowledge the high wildlife values of aspen old-growth that will be lost by proposed aspen "treatments." (page 7)

"...the DEIS, while noting that aspen treatments will involve either clearcutting or prescribed burning, fails to note for any alternatives what percentage of clearcutting or burning will be used, and where on the landscape such treatment types will be employed. This lack of description makes it impossible for the public, and the Forest Service as well, to adequately determine the impacts of the aspen treatment component of the SERP proposal... The Forest Service's omission of detailed information implies that clearcutting and prescribed fire have similar impacts. This is an unsupported conclusion." (page 8)

Response: The effects of the aspen regeneration treatments are discussed in the various resource Effects White Papers in Exhibit 37 and in Chapter Four of the FEIS. Moderate intensity fires would produce the best aspen regeneration so where fuel conditions allow, fire will be used in conjunction with commercial or fuelwood treatments. Areas where mechanical treatments will not be part of the regeneration prescription and only fire will be used are in the Chicken Head, Roadless Area, and Deer Creek Focus Areas and sites 110003 and 110004 in the Lower State Focus Area. Mechanical treatments with or without fire are proposed occur in the aspen sites in remaining Focus Areas (Spruces - 143 acres, Hancock Peak - 96, Lower State - 67).

Comment 7: "...in discussion potential impacts to wildlife, the EIS states that dead trees will fall down gradually, yet when discussing old growth, the EIS states that within five years the amount of old growth may be less than one percent. (p. 4-5) This seems inconsistent and fails to recognize that dead trees are an integral part of old growth forests." (page 14)

Response: Dead trees are indeed an integral part of old growth forests, however, old growth stands as defined by Hamilton (1993) contain greater than 15 live trees per acre greater than 15 inches in diameter and greater than 150 years old AND greater than 10 dead trees per acre plus other stand characteristics. Thus, the beetle affected stands are no longer classified as old growth but can remain standing as dead trees for many decades. Dead trees do provide structure for wildlife however, and the effects of removing this component is discussed on pages 4-48 to 4-66. Also see comment # 9, 29 and 30.

Comment 8: "On the issue of reforestation, the DEIS acknowledges that the SERP proposal would only increase reforestation rates for the project area by 10 years, in a range from 80 to 100 years, above the no action alternative (DEIS, 4-7). Given the negative impacts from logging (e.g., soil disturbance, increased forest fragmentation and wildlife disturbances), we must question whether such a minor and uncertain increase in reforestation rates (10-20%) is really much of a justification for this project." (page 3)

Response: As described above, accelerating the rate of reforestation and diversifying the species mix is beneficial for several resources. The effects of timber harvesting on affected resources are disclosed in Chapter Four of the FEIS.

Comment 9: "...the DEIS fails to note how clearcutting will address the paucity of aspen old-growth currently found within the SERP area... Simply clearcutting or removing 90 percent of the biomass through fire, will increase the percent of young growth but do nothing or actually decrease the percentage of aspen old-growth... The lack of large older trees, and the concomitant increase in saugs, downed logs and structure complexity, has significant impacts of wildlife species. Although not examined in any detail, the DEIS notes that the deficiency in large diameter trees has negative implications for northern goshawk... The Forest Service must examine the ecological implications of this continued paucity of aspen old-growth, and reconfigure the SERP proposal to include a strategy for remedying this deficit." (page 8)

Response: The lack of VSS 6 or old growth in the aspen forests within the SERP area is a function of the lack of climax aspen stands. Hamilton, et al. (1993) defines aspen old growth only in climax aspen stands. Nearly all the sites classified as aspen have conifer encroachment occurring and, if left undisturbed, will eventually convert to a conifer forest type. Classification of forest type is determined by the species with the predominant basal area. Once the trees in aspen stands reach a large diameter the stands have typically converted to a conifer forest type. Seral aspen stands with old growth characteristics could be produced by thinning from below and removing the conifer component. This has been previously done in some stands within the SERP area. As discussed in the wildlife section (page 4-48 to 4-66), dead trees from previous old growth stands provide structure and other habitat and the effects of the proposed actions are disclosed there.

Comment 10: "The EIS fails to show how roads will keep unauthorized OHV traffic out... Closure by revegetation and recontouring, and narrowing for 300 feet is unlikely to eliminate the damage done by construction, and will not be effective in many cases in keeping out determined OHV users - they will likely find a way around the 300 foot narrowing. Also, temporary gating is unlikely to deter ORV users who may simply find a way around the gate." (page 5)

"The EIS should acknowledge that road construction increases road density irrespective of road closures, especially if the road base and corridor remain, and especially if the Dixie knows it has a problem with unauthorized OHV use on closed or nonexistent roads." (page 6)

"On road rehabilitation... the Dixie knows that simple recontouring and reseding will not stop OHV intrusions, and any reseeding and recontouring will be torn apart by illegal OHV
use. Because the Dixie knows this has occurred in the past, is occurring in the present, and will likely occur in the future, its claim that road density will not increase because roads will be closed is oversimplifying the matter, at best. In this respect, the EIS fails to consider the environmental impacts of increasing the road density." (page 6)

12

"... the DEIS and Forest have not adequately addressed the effect on wildlife and recreation of roads and subsequent illegal road use... The DEIS is simply inadequate in addressing these issues." (page 3)

14

"... NEPA requires that the Forest Service must describe the effectiveness of all proposed mitigation measures, such as road closures. We expect to see such thorough discussion of road impacts and mitigation measures in the final EIS." (page 7)

Response: Implementation of any of the Action Alternatives will result in a reduction in the open road density within the SERP area from 2.43 miles per square mile to 2.33.

A short-term increase in open road density will occur under the Proposed Action and Alternative B to 2.49 miles per square mile from 2.43. The Forest acknowledges that transportation management is a challenging issue. The FEIS (page 2-14 and 2-15) specifies the closure of newly constructed and selected existing roads. There are many examples of effective road closures on National Forest System lands and the Forest is committed to utilizing any of these methods to effectively close these roads. Methods used will be determined at each individual site by assessing the topographic relief, adjacent vegetation, and other terrain features of the site. The closures will be monitored by law enforcement and District personnel and modifications maintenance will be made as appropriate to maintain effectiveness.

The Forest acknowledges that only contouring and reseeding may not effectively stop travel violations so additional measures may be necessary to effectively close roads as described above. The FEIS discloses the effects of building closing roads for each resource area in Chapter Four.

The proposed road into the Spruces Focus Area is proposed to be used as a non-motorized trail following completion of harvest activities. While it is not possible to guarantee that there will be no trespass by ATV users, every effort will be made to deter motorized use. Mitigation for this road is described in the FEIS on page 2-9 item 32. This includes gating, reducing the width of the road for the first 300 feet and signing. Also law enforcement would be utilized to reduce the incidence of trespass. The effects on recreation, including anticipated changes in experiences are described in the FEIS 4-13 through 4-22 and the Scenic, Recreation, and Wildlife Effects White Papers (available in the project file).

Hydrology / Water Quality

1

Comment 11: "While it is clear that harvest activities will impact water quantity and water quality, the extent or location of impacts is totally unclear." (page 14)

Response: Long term adverse impacts to water quantity and quality are not expected to result from any of the alternatives. The effects of harvest activities on water quantity and
quality for each alternative are discussed on pages 4-32 - 4-45 of the FEIS. The extent and locations of proposed activities under each alternative are shown in Appendix 12 of the FEIS.

Comment 12: "The EIS claims that the Blue Springs Creek CEW is at a low risk of cumulative impacts from the action alternatives, but then discusses the degraded nature of one of its tributaries, Deer Creek. The water quality problems associated with Deer Creek runoff into Blue Springs may be exacerbated with the proposed actions. Again the Blue Springs Creek assessment contains uncertainties, such as how much salvage, what types of aspen treatments, will the road be effectively rehabbed or will it be subject to illegal OHV use, which make the conclusion that "no long term impacts to water quality are expected" questionable. Please clarify these uncertainties in the final EIS in order to detail in greater certainty, the proposed actions' expected impacts." (page 15)

Response: It is unlikely that changes in long term sediment load (FEIS page 4-36) in Blue Springs Creek resulting from any of the action alternatives would be detected. The proposed vegetation treatments within this watershed will break up the continuity of vegetation, which will decrease the likelihood of wildfire affecting large percentages of the watershed. This, in turn, will reduce the risk of large sediment loads entering perennial waters.

The treatment acts of salvage harvest for the Proposed Action and Alternatives A and B are shown on pages 4-36, 4-39, and 4-43 of the FEIS, respectively.

Discussions of the road construction and what will be done to the road following project completion for each alternative are on pages 4-36, 4-39, and 4-43 of the FEIS.

Comment 13: "Is there a conflict with the current staging area at Lowder Ponds and Executive Order 11990 May 1977 i.e. degradation to wetlands?" (page 2)

Response: There are no proposed activities immediately adjacent to Lowder Ponds under the SERP FEIS. The landing areas near Lowder Pond are associated with the Sidney Valley timber sale project and there is no conflict with Executive Order 11990.

Comment 14: "We are struck by the fact that much of the SERP project is located in watersheds. Watersheds are so valuable and fragile they should be protected and preserved from destructive actions of logging and grazing." (page 2)

Response: Watersheds form wherever precipitation and runoff occur, therefore, it is impossible to propose management activities that are not within watersheds. Watersheds are often the basis for integrated land management decisions and natural resource analysis. The use of the term "watershed" should not be confused with domestic culinary water sources.

Comment 15: "We understand that additional spruce beetle infestation is expected to continue within the SERP project area for the next 10 to 15 years. Selected roads will be closed and reopened as necessary to meet future dead timber harvest needs. Upon project termination we recommend that elimination of road cuts be done to reduce sedimentation during spring runoff." (page 2)

Response: This recommendation will be considered if subsequent activities are proposed.
"Please specify if FWS participated in the determinations that Mexican spotted owl guidelines should not apply, and a different approach to recovery is needed." Has the Dixie consulted with FWS on the non-application of the [Mexican spotted owl] guidelines? (Page 9.)

Response: See project file (exhibit 12) letter dated August 13, 1997 to Forest Supervisors from Ron Rodriguez. Subject: Critical Habitat Designation for the Mexican Spotted Owl. The Forest Service has obtained concurrence from U.S. Fish and Wildlife Service on the determination of the Biological Assessment regarding Mexican spotted owl. Section 7 consultation with U.S. Fish and Wildlife Service has been conducted.

Comment 20: "Please specify whether or not the project area has been surveyed for Mexican spotted owls and what those results have been." (Page 9.)

Response: See the Project File (exhibit 14) "Mexican Spotted Owl Survey Boundaries" (map) with calculations: 11.189 acres surveyed in 1990, 15,489 acres in 1991, 12,931 acres in 1992 in the SERP area. (Surveys conducted in 1993 were on the Cedar City Ranger District but not in the SERP area.)

Comment 21: "The Dixie should choose Alternative A, which does not include the Chicken Head prescribed burn, in order to reduce the impact to Mexican spotted owl who may use the area." (Page 10.) The fact that Alternative A will be least impacting to endangered and sensitive wildlife should be reason enough to proceed with that alternative." (Page 7.) "The Dixie should adopt Alternative A as the preferred course of action to avoid such drastic impacts to three-toed woodpecker viability and habitat." (Page 12.) "Until northern goshawk reach a sustainable level, the Dixie should be very careful about short-term impacts, and choose alternatives that are least impacting to goshawk viability. At present, short-term impacts may be more impacting because of the species' tenous survival rate." (Page 12.)

Response: An endorsement of Alternative A. This alternative has been evaluated by the Responsible Official and rationale provided for why it was selected or not selected.

Comment 22: "Has the Dixie looked at specific requirements [for the northern goshawk] for Utah?" (Page 10.)

Response: There are no specific requirements in Utah for the northern goshawk. The best scientific data and recommendations available are in the Management Recommendations for the Northern Goshawk in the Southwestern United States (Reynolds et. al 1992). Although these recommendations are not specific to Utah, the Dixie National Forest uses them as a tool for habitat analysis and the intent of the recommendations to maintain goshawk habitat.

Comment 23: "While [large diameter trees will continue to decline as the spruce beetle causes mortality] does not justify annihilating large segments of goshawk territory when goshawks have been shown to utilize dead trees." (Page 10.) "The Dixie must not underestimate the impact to entire [goshawk] populations that [large treatments] may cause. The EIS should acknowledge that the sanitation may have severe implications to viability of goshawks or explain in greater clarity what the Dixie feels the overall impacts to goshawks will be." (Page 11.)

Response: The action alternatives do not propose to annihilate large segments of goshawk territory. Goshawk habitat is changing due to spruce mortality and would also change from the proposed activities. The effects of the No Action alternative are disclosed on pages 4-58 to 4-61. The effects of the proposed activities are disclosed on pages 4-52 to 4-53, and pages 4-45 to 4-58.

The watershed assessment conducted for the National Forest Management Act (NFMA) portion of our analysis included risk assessments to wildlife species including the northern goshawk. These watersheds were used as cumulative effects areas and the alternatives were measured against the risk assessments to determine if the action would change any of the ratings. The rationale is stated for the risk of effects on the pages cited above.

Comment 24: "The EIS fails to specify whether activities will occur at the same time. Without specifying what will happen and when, the public cannot determine whether the actions will have a greater . . . risk of affecting goshawks adversely." (Page 11.)

Response: Pages 2-5, 2-6, 2-8 to 2-9, 2-11 and 2-12 describe timing of activities. Page 4-52, and the Biological Evaluation for Sensitive Animal Species address the effects to the northern goshawk, and see "Recommended Goshawk Effects Analysis to Determine Mitigation Measure Use" in the Project File. The Biological Evaluation for Sensitive Animal Species is completed after an alternative is selected.

Comment 25: "The EIS should affirmatively specify whether timing restrictions [for goshawks] will be implemented so the public can determine the given risk to goshawk viability involved. The EIS should also require timing restrictions to be implemented to avoid, to the maximum extent possible, goshawk nest failure and territory abandonment." (Page 12.)

Response: The effects of the proposed activities are disclosed on page 4-52, and see "Recommended Goshawk Effects Analysis to Determine Mitigation Measure Use" in the Project File.

Comment 26: "The status of the Northern Goshawk is likely to change prior to or during the proposed action."

Response: As cited on page 3-36 the northern goshawk is both a management indicator species and sensitive species on the Dixie National Forest. We will continue to manage for viable populations of goshawks and will make appropriate adjustments in our actions where necessary if the status changes.

Comment 27: "The SERP project will have significant impacts on habitat for fish and wildlife, as well as on populations of sensitive and listed species of plants and animals. We are especially concerned about the project’s impacts on the Arizona willow, northern goshawk, Mexican spotted owl, peregrine falcon and three-toed woodpeckers. We incorporate the extensive comments of SUWA and WLUC on these important issues." (Page 13)
Response: We have consulted with the U. S. Fish and Wildlife Service (Section 7(c) of the Endangered Species Act). They are in concurrence that there may be effects, but no adverse effects to MSO and peregrine falcon (Federally listed species). The determination for northern goshawk, three-toed woodpecker, and Arizona willow are that there may be impacts to individuals or their habitats, but would not likely contribute to a trend toward Federal listing or cause loss of viability to the populations or species. The Utah Division of Wildlife Resources supports our evaluation and the project.

Vegetation Resource

Comment 28: "The EIS claims that there would likely be no effects to these [Arizona willow] populations because mitigating buffer zones will be implemented. The EIS ignores the fact that the mitigating buffer zones have been required in the past but disregarded because of economic desires. The final EIS should mandate that the conservation strategy, mitigating buffer zone be adhered to, regardless of whether or not it is desirable to recover the economic value of the wood." (Page 13)

Response: We concur that the Forest allowed the removal of an estimated 50 trees within Arizona willow buffer zone during implementation of the Rainbow Meadows II timber sale (1995). The original Rainbow Meadows sale (1993) was a density reduction prescription designed to remove the beetle infested trees and sanitize the area to reduce susceptibility to subsequent beetle attack in the early stages of the beetle epidemic. As with other project areas (Sidney Valley and Brian Head), this prescription was unsuccessful so reentry into the sale to remove additional beetle mortality was initiated. During sale preparation, Forest personnel inadvertently marked infested trees within a buffer area. This resulted in confusion with identifying similar areas on the ground and the trees were subsequently harvested.

The removal of a small number of trees in the Sidney Valley area was done with the concurrence of the U. S. Fish and Wildlife Service. Upon implementation, only one buffer area was entered and 20 trees were removed. The Forest is committed to maintaining the viability of Arizona willow by incorporating the recommendations of the Arizona Willow Intergency Technical Team into implementation design (FEIS 2.6, 4.11 and 4.12). No timber harvest reentries will occur in the proposed treatment sites within the SERP Focus Areas under this decision and the unit design will be monitored to ensure compliance with this mitigation.

Comment 29: "The Dixie’s forest plan states that 7.10% of the forested acres within a drainage should be managed to meet old growth characteristics and structure. SUWA is concerned with the EIS’ lack of clarity as to whether this management goal will be met. and the broad conclusory statements made regarding what "no action" may mean for old growth." (Page 13)

Response: An error was discovered on page 4-5 of the DEIS regarding this issue. The second sentence of the page now reads "Silvicultural treatments in green. UNINFESTED stands rather than infested stands. No treatments will occur in sites classified as old growth (FEIS 4-4) as defined by Hamilton et al. (1993). The spruce beetle is rapidly changing sites with old growth characteristics (FEIS 4-4). Sites with a surviving, mature green forest component will likely be the sites where old growth status is reestablished. A definition of "short term" versus "long term" discussed on page 4-4 and 4-5 may help clarify this concern. Short term would be considered less than 50 years and long term more than 100 years in this case. The spruce beetle flight in 1997 has affected the Hancock Peak Focus Area to the degree that the opportunity to reduce risk to beetle infestation as described in the FEIS (page 2-12, 2-13, 4-2, 4-3, 4-4, and 4-5) has been reduced. Thus, the opportunity to maintain or create old growth conditions with silvicultural treatments can not be accomplished in this Focus Area at the scale initially proposed.

Due to the scale of the epidemic it appears that the effects of all the alternatives (action and no action) on old growth are similar. The artificial reforestation associated with the action alternatives may accelerate the establishment of old growth in the SERP area in the long term (greater than 100 years).

Comment 30: The EIS’ treatment of impacts to old growth and compliance with the forest plan is entirely speculative... Not only are the estimations based on assumptions made, due to Dixie’s incomplete data, but the proposed silvicultural treatments are experimental. Thus, the claim that silvicultural treatments may maintain old growth or create conditions where old growth will establish in the short term is entirely without foundation." (Page 14)
Cedar City Ranger District  
Dixie National Forest

Responses to Comments

state of the existing resource is unknown, and no logging prescriptions are presented to ensure that old growth areas are not harvested." (page 11)

14 "The Forest Service needs to redo its analysis of 5 impacts. In addition, we reiterate that without more specific logging prescriptions and board foot levels, it will be impossible to ascertain the actual impacts of this project - or ensure that the SERP proposal is actually implemented as envisioned." (page 11)

Response: Please see the old growth definition summarized previously in the response to comment #7. The Forest concurs that the proposed silvicultural treatments to reduce risk of spruce beetle infestation and thus maintain or create old growth conditions are experimental (FEIS page 2-12 and 2-13). The Forest and the Forest Health Protection office in Ogden is interested in learning from the spruce beetle epidemic and determining if silvicultural treatments can be effective in reducing susceptibility. Retention of any green, mature spruce component will help establish a foundation from which to implement treatments in areas currently unaffected within the SERP or in other Engelmann spruce forests in the West.

The Project File (Exhibit 18, doc. 37) contains a description of the data base reliability. Large portions of the SERP area are located within unroaded rocky areas and formal stand characterization has not occurred. These areas were compared to stands where stand examination has been completed and the data from those exams were correlated to them. Correlations were determined by a certified silviculturist. In making the determination as to whether a stand contained old growth characteristics, all stands that were questionable were classified as old growth.

No treatments are proposed in conifer stands classified as old growth as defined by Hamilton et al. (1993). As disclosed on page 3-6 of the FEIS the percentage of old growth within the project area is estimated at 18 which exceeds the Forest Plan S&G of 7-10. These old growth stands are located in areas that have not yet been affected by the spruce beetle (southern portion of the SERP area). Prior to the outbreak of the spruce beetle epidemic this percentage of old growth was even higher. As stated on page 4-5 and 4-9 the spruce beetle is expected to continue a continued increase in the representation of old growth. Re-foresting beetle affected areas and retaining some of mature spruce component through the density reduction treatments in the Hancock Peak Focus Area would accelerate the successional, compositional, and structural trend of these sites.

Comment 31: “A major concern for us in the SERP project is the lack of protection of the unique nature of the spruce fir stands in the fragile, high altitude environment range with a short growing season. That these stands are in valuable water sheds presupposes habitat protection.” (page 11)

Response: Proposed management activities will be implemented with the design criteria and mitigation measures identified in Chapter Two (FEIS 2-4 to 2-11). The spruce fir forests comprise an estimated 322,273 (Vegetation Effects White Paper) acres within the four geographic subsections described on the Dixie National Forest which is more than 30 percent of the acreage. These forests are also well represented throughout most of the Forests in the mountain West.

7 Comment 32: Regarding "Undeveloped roadless areas, the small tracts of remaining wilderness and OSI growth", "We urge that you withdraw these areas to be preserved forever in their natural condition. Preserving these few remaining primeval ecosystems, for example, Spruce and the roadless Hancock should be a primary goal." (page 11)

Response: The effects of no treatment in the Spruces Focus Area are disclosed under Alternative A. The effects of no treatment in the Roadless Area Focus Area are disclosed under Alternative B. The primary objectives of the proposed activities in ecosystem rehabilitation through timber harvest, fuel reduction, reforestation and aspen regeneration.

7 Comment 33: "We urge that you allow timber to grow on long rotations and permit dominant trees to achieve physiological maturity and produce a higher quality of wood and fiber." (page 2)

Response: In green tree silvicultural prescriptions, trees are allowed to grow to physiological maturity before being harvested and the stands regenerated. In spruce stands this exceeds 120 years. The age of the trees being affected by the spruce beetle is up to 300 years. These ages represent physiological maturity for Engelmann spruce and will produce high quality wood products.

7 Comment 34: "Leave Aspen groves natural without interference" (page 2)

Response: An endorsement of the No Action Alternative in respect to aspen treatments. This alternative has been evaluated by the Responsible Official and rationale provided in the Record of Decision for why it was selected or not selected. Aspen is a disturbance dependent species. See the Vegetation Effects White Paper, the FEIS Chapter Four and comment 9.

14 Comment 35: "The DEIS notes that fire suppression has created changes in vegetation and forest structure and that within the proposed project area, 'more aspen is currently being lost than replaced by aspen regeneration'... No further information is provided to document this alleged decrease in aspen, or to note how and or where this trend might be occurring across the Dixie National Forest." (page 7)

Response: Within the SERP area the distribution of structural stages is displayed on page 3-5 of the FEIS. This compares the existing to the desired or properly functioning condition as defined by Amundsen et al. (1996 - Project File, Exhibit A-27, doc. 31). Analyses of stand examination data (on file at District office) also indicates a decline in the abundance of aspen in both the aspen and conifer stands. Aspen trees tend to be old (90+ years) with very few individuals in the seedling sapling stage. Much of the fuel on the ground consists of fallen aspen in many of the conifer stands which indicates that more aspen was present earlier in the trees successional stages of the stand.

14 Comment 36: The DEIS also fails to address whether merely returning fire to the landscape, as is proposed in the SERP, will adequately address aspen regeneration issues without further intervention such as cutting. The implied assumption that aspen will essentially disappear from the forest landscape without the active intervention of forest managers is without basis. This disturbance species will continue to regenerate, as it has throughout its evolution, as disease, insects, fire and windthrow create openings. Returning the landscape to historic
natural development processes and goals, which are now recognized as a necessary and integral part of ecological management. The Dixie

Response: As previously described, the representation of aspen in the SERP area is declining. The loss of aspen would be a loss to the ecological diversity and aesthetic value of the area. The Dixie Forest Service has developed a strategy for reintroducing aspen into the SERP area and is currently implementing this strategy through a combination of natural regeneration and active management.

Comment 37: "...we note that the conclusion of no old growth impact does not add up based on the impacts of proposed aspen treatments. The proposed alternative would result in the loss of 1,918 acres of aspen type identified in the SLRP area through clearcutting or prescribed burning (DEIS, 2-151). The result, as identified in Table 4-1 (188 acres, 4-3) and again in Table 4-16 (DEIS, 4-61), would be to decrease the percentage of old growth aspen (VSS 6) from 2% to 1%. It should be noted, however, that the findings in Table 4-1 contradict the findings in Table 4-10, which states that the proposed action eliminates the SERP aspen in VSS 6 aspen. This discrepancy should be addressed in the final EA. All changes should be reflected as an overall decrease in old growth when comparing alternatives. Decreasing the amount of old growth aspen, which is already in quite short demand within the project area, is obviously the wrong direction to be headed in reaching desired conditions or forest plan standards and guidelines." (page 10)

Response: Table 4-10 was in error and should be a one percent decrease in VSS 6 as described in other tables in the DEIS. This has been corrected in the FEIS. This one percent decrease (one site) is a small aspen stand and is not considered to be an old growth stand (Hamilton et al., 1993, page 45, exhibit 27, doc. 34). A stand classified as VSS 6 means that the average stand diameter is larger than 24 inches. Also see response to comment 9.

Response: Based on stand exam data, and reconnaissance of the project area no old growth aspen has been identified within the SERP area. No timber harvest treatments are proposed in stands classified as subalpine fir (greater than 30 percent of the basal area).

Roadless/Wilderness Concerns

Comment 39: "The Dixie should adopt Alternative A because it would preserve the undeveloped character of an 8,000 acre roadless area, known as Spruces... The Spruces area will likely be eligible for wilderness designation in the next forest plan revision, as it is a roadless area over 5,000 acres with no evidence of human development, or management activities. Yet if current trends continue, the Dixie will systematically shatter its remaining roadless areas." (page 3)

Regarding "Undeveloped roadless areas, the small tracts of remaining wilderness and Old Growth": "We urge that you withdraw these areas to be preserved forever in their natural condition. Preserving these few remaining primeval ecosystems, for example, Spruce and the roadless Hancock should be a primary goal." (page 1)

Response: Endorsements of Alternative A. This alternative has been evaluated by the Responsible Official and rationale provided in the Record of Decision for why it was or was not selected. The Dixie National Forest Land and Resource Management Plan (DNFRMP) 1986 assigned management areas in all National Forest acres managed by the Dixie National Forest.

Comment 40: "...the EIS does not address impacts to the wilderness qualities that Spruces possesses. The EIS should be altered to address each of the action alternatives’ impacts to Spruces’ wilderness characteristics and impacts to its potential wilderness designation." (page 4)

Response: This is incorrect. The EIS does address and analyze the impacts to old growth aspen in the Spruces area.

Response: The Forest Service’s description of the Spruces Roadless Area values consists of a single sentence: "The landscape of this Focus Area is dominated by dense ancient spruce that provide a cathedral-like canopy, and aspen with a spruce and fir understory" (DEIS, 3-20). Additional wilderness characteristics of the area, including esthetic and scenic values, backcountry recreational values, and fish and wildlife values, are not mentioned or are so scattered throughout the DEIS as to be insufficient to provide the reader with a thorough review of the specific characteristics and values of the area. (page 5)

Response: The SERP could render the Spruces Roadless Area and remaining roadless portions of the Hancock Peak Roadless Area ineligible for wilderness consideration by reducing the size of these areas below the 5,000-acre threshold for free-standing wilderness areas, or by significantly impacting the wild character of these areas. It is disingenuous for the Forest Service to degrade this roadless area right before it will be reconsidered for possible wilderness recommendation, especially with no discussion whatsoever of the wilderness values at stake." (page 6)
Response: Evaluations for determination of potential wilderness recommendation for the area in and adjacent to the Spruces Focus Area is outside the scope of this document. (The 1984 Utah Wilderness Act, which outlines the procedures for wilderness evaluation is located in the Project File Exhibit 34, Doc. 1) The project was analyzed as an EIS as a result of the Regional Office draft guidelines for "Project Analysis in Roadless Areas" dated April 21, 1997. This EJ memo recommended that any project that proposes altering the undeveloped character in areas where 5,000 acres or greater are roadless be analyzed as an EIS. The anticipated alteration to the undeveloped character of the Spruces Focus Area is disclosed in the applicable resource discussions in the FEIS, the resource Effects White Papers, and the Watershed Assessment.

14 Comment 43: "The DEIS also fails to provide the reader with an accurate depiction of the impacts on the Spruces Roadless Area. The reader is unable to discern how much the roadless area will be left after the sale; we are told only how much acreage will be impacted within the project area. Without a proper map delineating the full extent of roadless areas affected by the project, we cannot see if the roadless area involved in this sale will reduce the total amount of roadless area enough to prevent designation of a wilderness area. We urge the Forest Service to include in any subsequently prepared NEPA document such a description and a map showing how much of the roadless area will remain un loued inside and outside of the project area. In order to more clearly depict the loss of wilderness values, we request the Forest Service to include in any subsequently prepared NEPA document, maps showing potential wilderness (i.e., roadless areas) before the SERP sale and after the sale, and the ecological landscape impacts of losing that acreage from the potential wilderness land base." (page 54)

Response: A map is included in Appendix 11 in the FEIS showing areas with undeveloped characteristics. The Spruces Focus Area is not located in an area designated as an inventoried Roadless Area. The acreage of undeveloped character that would be altered with the Proposed Action and Alternative B is 801 in the Spruces Focus Area and the effects are discussed in Chapter Four. This would leave 6,671 acres that would retain undeveloped character. The evaluation or potential wilderness recommendation is beyond the scope of this document. The evaluation for wilderness recommendations will be addressed during Forest Plan revision, per the 1984 Utah Wilderness Act (Exhibit 34, Doc 1).

Social/Economic

1 Comment 42: "The Dixie's rationale for harvesting Spruces is to recover the economic value of dying timber. This rationale is extremely suspect when the costs of roadbuilding are taken into account. Spruces understory is so dense that walking in the project area is difficult. The amount of money involved in clearing a roadbed of dense understory and ancient trees, grading and leveling the roadbed, may make the economic value recovered minimal at best. (pages 3-4)

8 "This logging will not make money if value is given to the roadless area or if road costs, tree planting, erosion, watershed destruction, and administrative overhead are included. This looks like another taxpayer rip-off that fiscal conservatives keep complaining about." (page 1)

Response: Effects disclosed on page 4-68 and 4-69 are based on the Economic Efficiency Analysis, Project File, Exhibit 24, Doc. 31.

Soils and hydrology were not analyzed in the context of economics, but the effects to soils and hydrology for all alternatives and are discussed on pages 4-30 to 4-45 of the FEIS. Further documentation is contained in the Project File.

10 Comment 43: "... the infestation is already out-of-control and hope that the infestation can be logged thereby helping the local communities and keeping our tax dollars to a minimum." (page 1)

Response: Endorsement of the Proposed Action. The Proposed Action has been evaluated by the Responsible Official and rationale provided in the Record of Decision for why it was selected or not selected.

11 Comment 44: "... the infestation should be logged, instead of controlled burning, and used by the American people though prices and wages. Logging would help the local economy and keep the costs of the recovery to a minimum." (page 1)

Response: A partial endorsement of the Proposed Action with respect to proposed harvesting. Harvesting of dead and dying spruce is proposed in part, to recover the economic value of the wood fiber. If and when spruce become infested in only the Roadless Area Focus Area, prescribed fire would be used as the management tool rather than harvesting. Prescribed fire is proposed in addition to harvesting, to reduce fuel loadings and wildfire risk and stimulate growth of younger aspen stands. A combination of harvesting and the reintroduction of fire would best improve the biodiversity necessary to recuce the risk of future catastrophic events such as wildfire or insect and disease epidemics.

12 Comment 45: "Given what we predict volume to be and the costs associated with the proposed logging, we question how this sale will impact small independent loggers. The DEIS fails to address the potential impact to adjacent communities if an out-of-state, corporate timber company purchases the SERP volume. Again, given the potential volume from this project, it is conceivable that small operators will be unable to either afford or process this sale. Thus, the loggers themselves will be negatively impacted by the purchase of this sale from outside corporate interests." (page 2)

Response: Because of law and regulation, the Forest Service has no control over where qualified bidders choose to purchase and manufacture wood products. Regardless of whether sales are large or small, open to competitive bidding or restricted to a Small Business Administration set-aside sale, the manufacturing point is determined by the successful bidder. In the event that a timber sale is sold to a purchaser outside the Zone of Influence (Z01), local timber operators and manufacturing facilities lose an opportunity to process the product locally. However, subcontracting work for cutting, skidding, hauling, brush disposal, etc. generally utilizes local labor and thus benefits the local community. The effects of not harvesting timber on local communities are discussed on page 4-68, 4-69, 4-71, and 4-72 of the FEIS and in the Social Economic Effects White Paper.
The size and number of sales that would result from the implementation of an action alternative are part of the decision. The Forest recognizes that local sources rely on the sale of National Forest timber. Upon implementation of the selected alternative the number, size, and type of sales will be determined.

12 Comment 46: "...we do not at all agree with your assessment of the Present Net Value of the SERP project... By using stumpage figures from the latest cut and sold reports from Engelmann Spruce and Fiscal Year 1995 cost records, we predicted a huge loss from cutting within the Spruces area. We urge the Drose to take a close look at the validity of their economic analysis given the long history of below cost sales." (page 21)

Response: As disclosed in the Intermountain Region 1995 Timber Sale Program Informational Supplement, the Timber Sale Program was negative $1,148,000 when comparing direct revenues versus direct costs. This figure appears to be the basis for the conclusions made in this comment. The report also contains the reasons for that deficit and shows the present net value of timber at a positive $257,000. The economic effects disclosed in the FEIS are not based upon cost figures and the economic and industry conditions at the Forest level in 1995 but on current conditions and only on the SERP. Please also see response to comment 47.

14 Comment 47: "...we must question the economic calculations presented in Table 2-2, which compares the "economic measures" of the different alternatives. The calculations of jobs that will be generated by the project is based on the assumption of 8-3 jobs per million board feet harvested, and the calculation of income generated is based on the assumption of $387,000 mbf of the calculation of Present Net Value is also based these assumptions (DEIS 2-18). Not only is the basis for these assumptions not discussed, but since the DEIS provides no estimation of board feet to be harvested, we must question how these figures were calculated. The only hard figure provided is the cost of the environmental assessment. Additional information on the costs of roadbuilding and road rehabilitation, the amount and economic value of timber to be harvested, and the actual net return to American taxpayers from the sale must be provided in the final EIS." (page 12)

Response: An economic efficiency analysis was completed for this project based on the costs and benefits of timber outputs and the cost of the analysis. Present Net Value is the measure of economic efficiency, in which all the monetary flows occurring during different time periods are adjusted to reflect the effects of time on their value. For this analysis, preliminary volumes were used to compare the economic efficiency of the alternatives. Jobs and income multipliers were used to demonstrate the jobs and income created by the sale of the timber. Present Net Value is not based on the job and income multipliers, but both are part of the economic efficiency analysis. The full economic efficiency analysis is located in the Project File, Exhibit 24.

14 Comment 48: "The Forest Service notes that [4] the benefits and costs of non-commodity resources (i.e., recreation) are difficult to quantify, and that this as a justification, just briefly describes some of the social and economic impacts of the project in qualitative terms (DEIS, 4-68). While we appreciate the acknowledgment that non-commodity values are relevant, simply putting the ball on attempting to measure or even chart or list the costs and benefits of logging versus nonlogging alternatives is unacceptable... While the

DEIS notes that the project may result in negative impacts on tourism and recreation, no attempt is made to quantify or even catalog these impacts." (page 13)

Response: Quantitative and qualitative data on the recreation and tourism industries were used in the analysis. On the Cedar City Ranger District, decreases in visitation have not occurred due to bark beetle associated logging according to available data (Project File, Exhibits 21 and 24). On other forests where insects have caused landscape level mortality, a reduction in visitation has been documented in some instances. Where logging has been used to address the effects of the insects on these forests, a reduction in visitation has also been documented, although the reason for the decrease in visitation has not been substantiated as resulting from the tree mortality or logging specifically. As described in the Scenic, Recreation, and Social Economic sections of the FEIS, the corresponding Effects White Papers, and the Watershed Assessment, the effects of logging on recreation and tourism are expected to be short-term (<5 years), thereby causing short-term displacement of recreationists and visitors. Displaced recreation users are expected to remain in the general area. Increases in regional and State recreation and tourism tax, income, and visitation figures indicate a continued growth in the recreation industry due to the recreationists coming to the Cedar City Ranger District. The effects of logging are not based upon cost figures and the economic and industry conditions at the Forest level in 1995 but on current conditions and only on the SERP. Please also see response to comment 47.

14 Comment 49: "...the DEIS fails to analyze the quality of life benefits that draw visitors and retain residents in this area -- including such amenities as clean water and air, scenic vistas, and wild backcountry opportunities." (page 13)

Response: For discussions on the amenities of the Zone of Influence, Cedar City Ranger District, and Spruce Ecosystem Recovery Project, see the Recreation, Scenic, and Social Economic sections of the FEIS, pages 4-1-3 to 4-30, 4-67 to 4-73, and the Effects White Papers located in the Project File.

14 Comment 50: "...as the DEIS notes, only Garfield County will benefit directly from timber harvesting because of the sawmill in Escalante, but will only if the sale goes to this local sawmill (DEIS, 4-70). The likelihood of this outcome should be incorporated into the assessment of costs and benefits to the local community." (page 13)

"A final purpose given for this project is to "recover valuable wood products"... If indeed the justification for this sale is to recover economical value, it should be evaluated from a community viewpoint. Unfortunately, not enough information is provided to determine whether this sale will result in a net benefit to the U.S. Treasury and will be in the economic interest of the American public. If the justification is to provide wood to the local community, we note that there is only one timber mill in the economic Cumulative Effects Area (CEA). The DEIS should provide an analysis of the capacity of this mill, and whether this sale is likely to go to this local mill, in evaluating the real economic justifications for this sale." (page 3)
Response: As discussed on page 4-70, the FEIS states that Garfield County will receive the most economic benefit of timber is purchased by the mill in Escalante. A benefit to the largest timber manufacturing facility in the Zone of Influence does not preclude other logging operations or small logging and manufacturing operations from benefiting economically in Iron, Kane, or Garfield Counties. The effects of selling or not selling timber to local timber operations are further discussed in Social Economic Effects White Paper. The capacity of the Utah Forest Products sawmill located in Escalante, Garfield County and dependence on Dixie National Forest timber have been discussed in the Watershed Assessment. There will be several timber sales created from the Spruce Ecosystem Recovery Project and, therefore, opportunities for timber sales offered by the Cedar City Ranger District to be purchased by local timber operations. It is anticipated that Utah Forest Products, Jeff Middleton, Kevin Frandsen, Mountain Valley Timber, and Danny Peterson Logging will participate in the bidding process for sales offered from the Spruce Ecosystem Recovery Project area.

An economic efficiency analysis was completed for this project in which all costs and benefits were considered in the formulation of the Present Value. The full economic efficiency analysis is located in the Project File, Exhibit 24.

Scenic Resource

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Comment 51: "the Dixie claims Spruces will lose its scenic integrity as tree mortal-
ity increases. The claim fails to justify harvesting the ancient, pristine roadless area. Beauty is in the eye of the beholder, and many would prefer to see a dead forest than a forest devastated by chainsaws and roadbeds." (page 4)

Response: Existing and projected scenic integrity is a measure of the "intangibility" of the scenic resources in the landscape. The highest scenic integrity ratings are given to landscapes which are visually perceived to be complete, or which have little or no deviation from the character valued by constituents for its aesthetic appeal (USDA 1995, exhibit 19). The scenic integrity descriptions in the FEIS analysis are based on research available in the project file exhibit 191 that has found that the majority of people prefer a forest dominated by green trees to a forest dominated by dead trees. The analysis included in 4-22 to 4-30 in the FEIS and in the Scenic and Recreation Effects White Papers (available in the project file) addresses loss of scenic integrity in both areas that are harvested, and area that are not harvested but where the landscape is dominated by dead trees. The FEIS acknowledges that there is a range of preferences and sensitivity among forest visitors.

Comment 52: "Is logging debris lopped and scattered so it will decay rapidly and return to the soil, minimizing hazards from fire and insects? We have real concern here because areas as observed such as Rainbow Meadows and Tippets valley were not attractive after logging." (page 2)

Response: Proposed mitigation is described in FEIS 2-4 through 2-4. The mitigation that specifically addresses scenic resources is included on pages 2-7 through 2-8. The Scenic and Recreation Effects White Papers include photos of related timber harvest activities and additional description of the effects, in addition to analysis included in the FEIS.

Insects and Disease

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Comment 53: "... the spruce bark beetle is a naturally evolving occurrence. The Dixie has been responding to the "beetle epidemic," which they acknowledge occurs approximately every 300 years, by increasing the amount of timber taken of the forest. The result may be devastation far worse than the beetle would have caused. The Dixie should use Spruces as a case study to see what happens when the natural cycle of beetle kill is allowed to run its course." (page 4)

Response: An endorsement of Alternative A or No Action. Personnel from the Forest Health Protection office have established several long-term monitoring plots within Cedar Breaks National Monument and the Ashdown Gorge Wilderness area as well as other areas where salvage activities have occurred or would occur under the SERP.

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Comment 54: Mr. Roth included an Associated Press article published in the Las Vegas Review Journal, 11/13/97, in which the University of Nevada, Reno was cited as experimenting with pheromones to lure bark beetles into traps in the Lake Tahoe Basin as method bark beetle control. Referencing this article Mr. Roth stated, "Thought this might help you in your battle against the spruce beetle. Maybe you could form a cooperative effort with UNR." (page 1)

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Mr. Marr included an Associated Press article published in the Las Vegas Review Journal, 11/13/97, in which the University of Nevada, Reno was cited as experimenting with pheromones to lure bark beetles into traps in the Lake Tahoe Basin as a method for bark beetle control.
control. Referencing this article Mr. Marr inquired, "Are you aware of the activities of the U.N.R.?" (page 1)

Response: This treatment is most effective when beetle populations are at less than epidemic levels (Exhibit 3). Personnel from the USDA Forest Service Forest Health Protection office in Ogden have provided recommendations to control the bark beetles from the beginning of the epidemic. Based on current information, it appears that management activities, including use of trap trees are ineffective at controlling the spread of epidemic levels of spruce bark beetles.

Comment 55: "We have learned that uprooted and broken trees are excellent breeding places for beetles and that it was found that bark beetles are attracted to stumps, slash and injured trees and later through residual stands." (page 2)

Response: We concur with this statement. In areas where a green, residual stand can be retained, brush disposal measures must properly dispose of logging slash to reduce to potential habitat for bark beetles.

Comment 56: These proposed actions have been shown to be inequitable in stopping the beetles. The catastrophic nature is overplayed by the industry." (page 1)

Response: We concur with the first sentence. The proposed action and analysis are based on entomology and other scientific sources. The purpose is economic recovery, reduce fuel levels, and more rapidly rehabilitate a forest forest except in the Hancock Peak Focus Area where is hoped that silvicultural treatments may prove successful in retaining a live, green conifer forest.

Comment 57: "Restoration and preservation of nearby habitats will be needed to help make up for the beetle losses. This should include halting development, obliterating roads, stopping logging and grazing, and protecting remaining natural stands, as well as restoration." (page 1)

Response: Portions of this comment are outside the scope of this project (halting development and stopping logging and grazing). Portions are addressed in the proposed actions mitigation.

Comment 58: The DEIS notes repeatedly that the spruce-fir ecosystem of the SERP area has a historical successional pattern that involves periodic stand-replacement episodes from natural disturbance, including insect epidemics. The Forest Service thus admits that the current beetle outbreak is an inevitable and natural phenomenon. Despite this admission that beetle outbreaks are a function of ecosystem functioning, and, indeed, has even been facilitated by past management practices, the Forest Service appears to "fix" this natural process by further logging intervention. (page 2)

Response: Timber harvest is one of the discretionary activities under the Forest Service’s multiple use mandate that occur on National Forest System lands. The purpose of the proposed timber harvest is economic recovery of wood products, reduction of fuels to desired levels and to allow for a more rapid rate of reforestation which will lead to the rehabilitation of a conifer-aspen forested system. (FEIS page 1-4)

Comment 59: "We... oppose strongly the Forest Service’s proposal to "treat" (no cut levels area provided) such a large acreage of forest land, including building roads into previously pristine areas, to prevent a beetle outbreak that appears inevitable and unstoppable. As the DEIS notes, the beetle outbreak will most likely end when host trees are used up, or a severe winter occurs (DEIS, 3-8). The Forest Service offers no evidence in the DEIS that proposed treatments will be able to prevent the spread of beetles on the landscape level; thus, the logging treatments proposed by SERP cannot be justified as a means of restoring so-called "forest health." At best, the DEIS only provides rationale that warrants experimental cutting in the Hancock Area in order to gain further understanding of ecosystem processes." (pages 2-3)

Response: Exclusive of the Hancock Peak Focus Area, proposed treatments for the purposes described are on pages 1-4 and 1-5. There is indeed little evidence that with the current spruce beetle populations silvicultural treatments can be effective in controlling infestations. The activities would improve forest health in terms of the protection of the soil resource from the effects of catastrophic fire which can adversely affect productivity and stability of the establishment of regeneration, and, allow for a more rapid rate of reforestation which would provide cover for the wildlife, soil, recreation, and scenic resources (FEIS Chapter Four). Planting spruce will increase the representation of spruce in areas deficient of seed sources. This will contribute to diversifying the species composition and increase the representation of a species that grows to larger diameters and will provide better forest structure in the long-term (100 years.)

Transportation

Comment 60: "The Dixie has stated that no road construction will occur in the Roadless Area Focus Area that is slated for fire reintroduction. The EIS should state this fact in the description of the proposed action." (page 6)

Response: We concur to clarify: no road construction is proposed to occur in areas associated with the prescribed fire proposal (Chicken Head and Roadless Area Focus Areas).

Comment 61: "Where do you address ‘returning logging roads to original condition,’ which ones and where?' In particularly the road called ‘from my subdivision (Rainbow Meadow) to Lower Pond.’ This road must return to ‘trail’ status in order to preserve the environment. (area 2A and MA1)” (page 1)

Response: The roads that are currently open and will require pre-haul maintenance (18.5 miles) are associated with harvesting within the Focus Areas. These roads will be left in a condition to ensure proper drainage following completion of project activities. The road into
the Lowder Pond will be managed according the direction contained in the Sidney Valley Recovery Project EA and the timber sale contracts associated with the Sidney Valley Recovery Project.

14 Comment 62: "We citerate our strong opposition to any additional road construction, especially within the Spruce Roadless Area, and urge the Forest Service to reconfigure the SERP proposal to avoid this pristine area." (page 6)

Response: An endorsement of Alternative A. This alternative has been evaluated by the Responsible Official and rationale provided in the Record of Decision for why it was selected or not selected. Alternative A was designed to address the undeveloped character issue. Also see response to comment 41.

Comment 63: "Road density on the Dixie already exceeds the recommended two miles of road per square mile. The Dixie should refrain, then, from constructing or reconstructing roads which will add to its excessive road density." (page 5)

Response: An endorsement of the No Action alternative in respect to road construction and reconfiguration. This alternative has been evaluated by the Responsible Official and rationale provided in the Record of Decision for why it was selected or not selected. Please also see response to comment 1.

Recreation

7 Comment 64: It was edifying to read that area emphasis is recreation under the forest plan direction. The desired future condition of providing users with high probability of experiencing a feeling of isolation, tranquility and self reliance in a natural environment was an inspiration and a value which I assure you will rate high with many forest users." (page 2)


Soils

7 Comment 65: "We ask that extreme care be used to avoid damage to soils, an all important resource. Destruction of vegetation by fire can also lead to deterioration of stabilized root systems. Some questions regarding soil, we have are: Is logging conducted with light small equipment that does not disturb the soil especially in SERP's fragile environment? Is erosion kept to a minimum? Are there any restrictions applied to logging equipment in order to protect young trees? Is logging debris lopped and scattered so it will decay rapidly and return to the soil, minimizing hazards from fire and insects?" (page 2)

Response: Pages 4-30 to 4-45 of the FEIS describe effects of the proposal on the soil and hydrology resource. Reference is made to the EffectsWhite Papers describing the effects on soil and hydrology (Exhibit 37). Page 2-4 and Appendix 5 of the FEIS discuss mitigation recommended to reduce damage to the soil and hydrology resources to within an acceptable range. Slash will be treated as described on page 2-4 to 2-9 of the FEIS.

Forest Plan Amendment

1 Comment 66: "This forest plan amendment is overly broad and will be very for reaching, considering that nearly all timber sales emerging from the Dixie currently have as a rationale an "insect" component (i.e., the timber harvest is necessary because of mortality caused by insect attack). If present trends continue, nearly all timber sales coming out of the Dixie will be exempt from the opening size limitation. SERP, a site-specific project, is not the forum to amend the forest plan." (page 7)

1 "The proposed forest plan amendment will eliminate the 60-day public review and approval by the regional forester required for openings larger than 40 acres if such openings are a result of beetle attacks. Continuing to justify exemptions to the opening size limitation on a case-by-case basis should be the rule of thumb until the forest plan is amended. Especially since the Dixie National Forest Plan definition of opening is more inclusive than that in NFMA. If the Dixie wants to amend its forest plan, it should do it through the forest planning process with full public involvement that would come with forest planning, which may not be involved in site-specific project analysis." (page 7)

8 "The Forest Plan should not be amended and sets bad precedent." (page 1)

12 "... we adamantly oppose any amendment to the Forest Plan which will limit public input and allow larger openings to be created... A limitation on opening size was enacted to reduce the impacts of logging activities... This proposed amendment appears to be a back door attempt to increase wood volume output and limit public involvement. It is unarranged and unneeded." (page 3)

14 "The NFMA sets up a formal procedure for amending forest plans, which requires that issues and results be thoroughly analyzed and submitted for public review... before an amendment is adopted. The DEIS, however, provides no analysis whatsoever of the proposed forest plan amendment... the case-by-case application of a forest plan amendment is not an adequate forum for analyzing the relative benefits of a forest-wide amendment." (page 11)

14 "... the SERP DEIS is not the place to propose a forest plan amendment which is not necessary to achieve the project proposal. As the DEIS notes, Regional Forester Dale N. Bosworth already granted a programmatic exemption... and notes that in past years exemptions have
been also granted on a case-by-case basis (DEIS, 8-1). This forest plan amendment is not needed for this project to proceed.” (page 12)

“"The forest plan revision process is the appropriate forum for analyzing forest-wide policy, and will draw a much larger level of public participation than a particular timber sale. Given the lack of urgency surrounding this proposed amendment -- since a programmatic exemption is currently in place -- the Forest Service should raise the issue opening size limitations during the revision process." (page 12)

Response: The Responsible Official believes that the proposed amendment to the existing standards and guidelines is important to better meet existing Forest Plan (LRMP) multipurpose goals and objectives, desired future conditions and management area direction. The amendment is nonsignificant because it will not alter or change the LRMP goals and objectives, management area allocations, location or prescriptions. Therefore, completion of this amendment through the SERP analysis, public review and disclosure, and future decision process is appropriate.

The proposed forest plan amendment is specific to the type of event where the requirement for a 60-day public review and approval by the Regional Forester would no longer apply. The amendment would remove the requirement for a review and approval process only for openings caused by a catastrophic event (i.e. fire, insect and disease and windstorm). The 60-day public review and Regional Forester approval requirement for openings greater than 60 acres found in the Intermountain Regional Guide (Exhibit 28, document 7) is beyond that which is specified in NFMA and 36 CFR 219. The requirements in National Forest Management Act and 36 CFR 219 were intended to be used when proposed even-aged harvest operations (i.e. clearcuts) in a live forest would exceed the 40 acre limitation. By removing a live forest through even-aged harvest treatments, management has made a conscious decision; in other words the agency had a choice on what size opening would produce a more desirable combination of net public benefits (36 CFR 219.27(d)).

Where a catastrophic event causes the larger opening, there is no choice relative to whether a larger opening is in the best public interest because the extent of the insect epidemic or fire already generated the opening size. The choices to make are how to respond to the aftermath of a catastrophic event and how to reduce the public involvement and disclosure outlined in NEPA (40 CFR 1500-1508), and the Regional Forest Service Plan (LRMP) is a reasonable range of alternatives (i.e. alternatives as displayed in the SERP FFEIS). Public review and involvement in determining what the most appropriate response to this catastrophic event is the purpose of the SERP environmental analysis and disclosure process.

It should be noted, the proposed amendment does not change the definition of what is considered an opening under the LRMP, but defines procedures to follow when the agency has a choice in whether to create larger openings (i.e. even-aged harvest treatments in a live forest) vs. when a catastrophic event has caused the opening.

The SERP environmental analysis, public involvement and disclosure process, and future decision document are appropriate means by which to amend the existing DNF-LRMP. Section 1604 of NFMA clarifies that forest plans will not only be developed and revised but also maintained. The planning regulations at 36 CFR 219.10(a)(3) state that the interdisciplinary team... shall continue to function even though membership may change and monitor and evaluate planning results and recommend revisions and amendments.

Determination of whether an amendment to the existing plan, or revision of the plan is needed depends on the significance of the identified "need-to-change". Forest Service Handbook 1909.12, chapter 5, section 5.32, defines the process for amending the Forest Plan. Documentation of this assessment are located in the project file (Exhibit 28, document 8). This analysis found no measurable change would occur relative to the 6 decision points of the DNF-LRMP. However, it did recommend that additional follow-up with the Regional Office and Office of General Council should be done to assure further documentation relative to the Regional Guide was not required prior to completion of the amendment to the Forest Plan. Therefore, the Forest Supervisor has decided to defer making the decision on this amendment until such time that this follow-up work is completed.

Comment 67: "SERP's forest plan amendment is unnecessary at this time. Intermountain Region forester Dale N. Bosworth granted a programmatic exemption of Regional approval of openings created by the removal of salvage timber form areas harvested as a result of catastrophic bark beetle infestations. The programmatic exemption of Regional approval makes a forest plan amendment unnecessary." (page 7)

Response: It is correct that the Regional Forester has granted a programmatic exemption relative to the requirements in the Intermountain Regional Guide for openings caused by insect epidemics. However, in this same letter the Regional Forester recommended that the Forest should address this issue and amend the Forest Plan on a case-by-case basis or perhaps through a forest-wide amendment to the Forest Plan that allows an exemption to the opening definition for catastrophic situations (Exhibit 28, Document 3).

Taking this advice under consideration the Dixie National Forest Supervisor believed that the public would best be served through a forest-wide amendment. This is because the choices surrounding the aftermath of a catastrophic event are not relative to the size of opening to create (because the event dictated that), but rather alternatives on the amount of dead and dying trees to salvage, number of acres to rehabilitate actively through management, or amount of area to leave in whatever condition the event dictated. The 60-day public review and approval process presently required in the Regional Guide for openings caused by catastrophic events is duplicative of existing NEPA project level public review and disclosure requirements and therefore unnecessary.

Comment 68: "... the NEPA requires agencies in preparing EIS's to examine an array of alternatives that propose a range of options for addressing management issues. The Forest Service, however, proposes the same forest plan amendment for all alternatives in the DEIS; consequently, no action alternative is considered that does not amend the current forest plan. There is no discussion of a "no action" forest plan amendment alternative. This is a clear violation of NEPA." (pages 11-12)

Response: The process for amending a forest plan has been previously described. During the implementation of forest plans "needs-to-change" are identified and analyzed based on
procedures previously outlined above. This process was followed and an amendment proposed. The decision is whether to amend or not amend for the reasons documented during the completion of this process, which includes public review through the original scoping period prior to completion of the FEIS and DEIS comment period. The range of alternatives is represented by either implementing the change for reasons identified, or continuing with the present plan requirements. Relative to the SERP project, a programmatic exemption from the requirements in the DNF-LRM and the requirements of the FEIS is apparent. Many of the timber sales which included an open size limitation. Thus, in the future all of the sales on the Dixie National Forest would have unlimited size openings. (page 12)

Response: Refer to responses for the first two comments in this section. In addition, the proposed amendment does not affect all timber sales on the Dixie National Forest involving insect mortality. It would only be pertinent if the project involved a catastrophic event which caused large openings. Many of the timber sales on the Dixie National Forest are subject to insect mortality levels that are at least an epidemic proportion in order to attempt to keep them from every reaching catastrophic proportions.

Fisheless Resource

1 Comment 70: SUWA is also concerned with the uncertain impacts to water quality as they may affect fish rearing streams and fish habitat in the project area. The class 3 trout streams in the project area comprise about half of the total stream fishery habitat in Utah, and support a significant amount of angling. (p. 3-28) The habitat conditions for Bunker Creek and Deer Creek are already considered poor. (pp. 3-28 - 3-29) SUWA is concerned with the proposed actions’ impacts on this resource.

Response: To clarify, Class 3 trout streams are found throughout Utah and comprise about half of the total stream fishery habitat in the State. Within the project area, there are several Class 3 streams including Mammoth Creek, Lowder Creek, Castle Creek, and Bunker Creek (p. 3-28). These streams only comprise a small portion of the Class 3 streams in the state, not half.

Direct, indirect, and cumulative effects to the fishery resources within the analysis area are discussed in Chapter 4, pp. 4-45 - 4-47.

Fire/Fuels

7 Comment 71: Some regime of controlled burning is essential to maintain balance and to prevent disastrous fires. The SERP project places far too much emphasis on the use of fire. (page 2)

Response: The purpose of prescribed fire is primarily to increase species and structural diversity across the landscape and to reduce the risk of catastrophic fire. Up to 4,908 acres or 13 percent of the forested area within SERP is proposed for burning. The Parameters for Management Ignited Prescribed Fire document is located in the Project File (Exhibit 30, doc. 2). Ignitions will be timed to produce a mixed severity fire regime which will produce natural vegetation mosaics, retain large diameter trees and down logs, and minimize soil and hydrological impacts. Forests evolve with disturbance regimes such as insect epidemics and wildfire and implementation of a controlled disturbance like prescribed fire can create the desired vegetative conditions and reduce the risk of catastrophic events. (page 3)

Response: A qualified endorsement of the actions proposed in the Defensible Fire Suppression zones. The intent of DFS zones are to create fuel conditions where fire suppression personnel can stop or slow a wildfire along urban interfaces. The establishment of DFS zones is intended to be permanent and will be required to be maintained at regular intervals.

Range Resource

7 Comment 73: Although production and range conditions will be improved with water development and fences, we are sorry to note livestock grazing will remain the same. The project area is already at risk from beetle attack. It would seem prudent to greatly reduce grazing allotments and give an already degraded forest a rest. (page 2)

Response: This is outside the scope of the Spruce Ecosystem Recovery Project. However, livestock grazing will be deferred in aspen regeneration areas and areas naturally reforested or planted from sheep graziers for up to five years (page 2-5, FEIS). Grazing allotments are administered as described in the individual allotment management plans and the terms and conditions listed in the term grazing permits. (page 2)

General Comment

3 Comment 74: I want to go on record as supporting your Spruce Ecosystem Recovery Project proposal, to cut down the beetle-infested spruce trees, cut down or burn the aspen trees and burn overgrown trees in the proposed areas to reduce the threat of an uncontrolled conflagration in the future. (page 1)

Response: An endorsement of the Proposed Action. This alternative has been evaluated by the Responsible Official and rationale provided for why it was selected or not selected. (page 1)

6 Comment 75: I agree with alternative “A” page 4-29 and 4-19. (page 1)
Response: An endorsement of Alternative A. This alternative has been evaluated by the Responsible Official and rationale provided for why it was selected or not selected.

6 Comment 76: "Error page 3-27 - Rainbow Meadow Subdivision gets their water from a spring." (pages 1-2)
Response: Error is confirmed and corrected in the FEIS.

7 Comment 77: "We urge you to practice the kind of excellent forestry that safeguards the management of all the various renewable resources of the Dixie, so that they are utilized in the combination that will best meet the needs of the American people." (page 1)

7 "... we ask that you manage the Dixie for the Preservation of ecosystems, wildlife and scenic integrity for it is what the American people expect." (page 2)


8 Comment 78: "Going into a Roadless Area to do logging in the name of forest health is a hoax. Utah has very few Forest Roadless Areas. Cumulative Effects have been ignored. Forest Health necessitates preservation of roadless areas." (page 1)
Response: The cumulative effects of activities proposed in the roadless areas are disclosed in Chapter Four of the FEIS.

9 Comment 79: "Yes we feel it is most important for the dying spruce trees and other trees which have the bark beetles be cut for timber. Those not good for timber should be burned to keep the forest recover. Yes, we think... the Spruce Ecosystem Recovery Project is good for the Dixie National Forest, good for the environment, good for the working Americans and good for Utah's people." (page 1)
Response: An endorsement of the Proposed Action. This alternative has been evaluated by the Responsible Official and rationale provided for why it was selected or not selected.

10 Comment 80: "We have studied the Environmental Impact Study and also travelled the area of beetle infestation and agree that Alternative B should be implemented with more logging and less controlled burning and feel that roads are necessary to control the beetle infestation." (page 1)

11 "I believe that Alternative B should be implemented. However, I don't feel that it will totally alleviate the beetle infestation and believe that much more should be done before the forest is no more. As it is now, because of the lawsuit with the Friends of the Dixie Forest, the forest

is dotted with dead and dying trees. If drastic measures are not taken soon and if SUWA appeals as did Friends of the Dixie Forest, the beetle infestation will become out-of-control if it isn't already." (page 1)

Response: Endorsements of Alternative B. This alternative has been evaluated by the Responsible Official and rationale provided for why it was selected or not selected.

Comments Received After November 24 Deadline

Comments Received from Utah Division of Wildlife Resources

Transportation Resource

15 Comment 81: "Currently the SERP area contains 2.43 linear miles of road per square mile, and after the proposed action it will have 2.46 miles of road per square mile. UDWI encourages the USFS to make every effort to bring this area into compliance with the Dixie LRMP." (page 1)
Response: Errors were discovered on Table 2-2 (page 2-18) in the Road Closure category and is corrected in the FEIS. Existing road density is 2.43 miles per square mile (No Action). Road densities upon completion of project activities would be 2.33 miles per square mile (action alternatives). Road densities during project implementation would 2.49 for the Proposed Action and Alternative B and, 2.44 for Alternative A and the modified Proposed Action. An additional 27 miles of road would require closure in order to comply with the 2.0 miles per square mile standard and guideline for the entire SERP area. This is not practical in the northern portion of the SERP area where the activities are proposed to occur. Subsequent activities proposed in the southern portion of the SERP area could include additional road closures.

15 Comment 82: "We recommend the four miles of new road into the Spruces also be obliterated and reseeded with a native see mixture." (page 1)
Response: We will consider this recommendation as part of the decision to be made.

15 Comment 83: "We recommend leaving a minimum of 300 feet of live or dead trees for vegetation buffer screens, wildlife movement corridors, and riparian habitat protection zones." (page 1)
Response: The buffers incorporated into sale design will be a minimum distance that maintains the integrity of the resources they protect. Buffers incorporate topography, vegetation, and Focus Area design and location.
Spruce Ecosystem Recovery Project
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*Received after November 24, 1997 comment period deadline.
APPENDICES

1. Forest land Suitability/Soil Type Map
2. Forest Plan Management Area Map
3. Forest Plan Standards and Guidelines for Management Areas 1, 1B, 2A, 2B, 6A, 7A and 9A*
4. Critical Watershed/Riparian Conservation Areas Map
5. Soil and Water Conservation practices*
6. Location/Site map
7. Canopy Closure Map
8. Watershed Assessment Map
9. Transportation System Map
10. Cumulative Effects Maps/Tables:
    a) Vegetation Cumulative Effects Map;
    b) Watershed Cumulative Effects Map;
    c) Recreation Cumulative Effects Map;
    d) Scenic Resources Cumulative Effects Map;
    e) Range Cumulative Effects Map;
    f) Air Quality Cumulative Effects Map;
    g) Wildlife Cumulative Effects Map;
    h) Summary Table of Vegetation management Activities Within Cumulative Effects Areas That Were Considered in the Analysis.
11. Areas with Undeveloped Characteristics Map
12. Monitoring Plans

* See DEIS for this Appendix

APPENDIX 1

FOREST LAND SUITABILITY/SOIL TYPE MAP
APPENDIX 10

CUMULATIVE EFFECTS MAPS/TABLES:
a) Vegetation Cumulative Effects Map;
b) Watershed Cumulative Effects Map;
c) Recreation Cumulative Effects Map;
d) Scenic Resources Cumulative Effects Map;
e) Range Cumulative Effects Map;
f) Air Quality Cumulative Effects Map;
g) Wildlife Cumulative Effects Map;
h) Summary Table of Vegetation Management Activities Within Cumulative Effects Areas that were Considered in the Analysis

APPENDIX 11

AREAS WITH UNDEVELOPED CHARACTERISTICS MAP
APPENDIX 12

MONITORING PLANS
APPENDIX 12

MONITORING PLANS

HYDROLOGY/SOILS

OBJECTIVE: Determine if SWCPs associated with road construction and skid trails were implemented, and determine their effectiveness in meeting the desired goals of soil and water resource protection.

ITEM TO MONITOR: SWCPs associated with road construction and maintenance.

TYPE OF MONITORING: Implementation and Effectiveness.

METHODS/PARAMETERS: Field review, visual observation, and photographs.

FREQUENCY/DURATION: Annually, during project implementation.

OBJECTIVE: Determine if SWCPs associated with road construction and skid trails were implemented, and determine their effectiveness in meeting the desired goals of soil and water resource protection.

ITEM TO MONITOR: SWCPs associated with road construction and maintenance.

TYPE OF MONITORING: Implementation and Effectiveness.

METHODS/PARAMETERS: Field review, visual observation, and photographs.

FREQUENCY/DURATION: Annually, during project implementation.

PROJECTED COSTS: Salary for field reviews and writing reports.

REPORTING PROCEDURES: Results will be reported in the annual water quality monitoring report.

RESPONSIBILITY: West Zone Hydrologist and Forest Soil Scientist

HYDROLOGY/SOILS

OBJECTIVE: Determine if SWCPs associated with road obliteration, rehabilitation, and closure were implemented, and determine their effectiveness meeting the desired goals of soil and water resource protection.

ITEM TO MONITOR: SWCPs associated with road obliteration, rehabilitation, and closure.

TYPE OF MONITORING: Implementation and Effectiveness.

METHODS/PARAMETERS: Field review, visual observation and photographs.

FREQUENCY/DURATION: Annually for 2 years following project completion.

PROJECTED COSTS: Salary for field reviews and writing reports.

REPORTING PROCEDURES: Results will be reported in the annual water quality monitoring report.

RESPONSIBILITY: West Zone Hydrologist and Forest Soil Scientist
HYDROLOGY/SOILS/FISHERIES

OBJECTIVE: Monitor the effects of species mortality, timber harvest, and road construction on water quality within the Center Creek watershed, and determine the effectiveness of SWCPs in preventing or minimizing non-point source pollution.

ITEM TO MONITOR: Aquatic macroinvertebrates.

TYPE OF MONITORING: Baseline and effectiveness.

METHODS/PARAMETERS: Samples will be sent to the National Aquatic Ecosystem Monitoring Center in Provo, Utah or Logan Utah.

FREQUENCY/DURATION: 1-2 years following project completion.

PROJECTED COSTS: Salary for field sampling and laboratory analysis of samples ($500).

REPORTING PROCEDURES: Results will be compared to pre-project data and reported in the annual water quality monitoring report.

RESPONSIBILITY: West Zone Hydrologist.

HYDROLOGY/SOILS

OBJECTIVE: Monitor the effects of timber harvest and skidding on water quality within the Mammoth Creek watershed, and determine the effectiveness of SWCPs in preventing or minimizing non-point source pollution, determine if water quality is within State Standards.

ITEM TO MONITOR: Physical and chemical characteristics of stream water. This monitoring will be completed through the Cooperative Water Quality Monitoring Program with the Utah Division of Water Quality.

TYPE OF MONITORING: Baseline and effectiveness.

METHODS/PARAMETERS: Samples will be sent to the Utah Division of Water Quality in Salt Lake City for analysis.

FREQUENCY/DURATION: One time, following project completion.

PROJECTED COSTS: Salary for field sampling.

REPORTING PROCEDURES: Results will be reported in the annual water quality monitoring report.

RESPONSIBILITY: West Zone Hydrologist.

RECREATION

OBJECTIVE: Monitor recreation use to determine if harvest activities have reduced or shifted use.

ITEMS TO MONITOR: 1) Shore days and lift and shuttle use as reported by Brian Head Ski Resort. 2) Trail Counts on Sydney Peaks Trail, Rattlesnake, and Virgin River Rim Trail. 3) Traffic counters operated by Cedar Breaks National Monument and UDOT’s permanent traffic counter on Highway 14. 4) Quarterly Sales Tax Receipts for Brian Head Town. 5) Campground receipts for campgrounds located on the Cedar City Ranger District.

TYPE OF MONITORING: Implementation

METHODS/PARAMETERS: Assemble information reported by Brian Head Ski Resort, Brian Head Town, Cedar Breaks National Monument and Utah Department of Transportation. Monitor trail counters on the Virgin River Rim, Rattlesnake, and Sydney Peaks trails.

FREQUENCY/DURATION: Implementation—Before sale operations began, both summer and winter. Compile information once a year for 10 years to determine if changes in use and location occur.

PROJECTED COSTS: Implementation—$500. Effectiveness—$500

REPORTING PROCEDURES: Forest Monitoring Report and or Project File

RESPONSIBILITY: District Ranger and Zone Landscape Architect.

VISUAL RESOURCES

OBJECTIVE: Maintenance and or enhancement of visual variety in the landscape

ITEM TO MONITOR: Percent of aspen in the stands; presence of large trees with high canopies and snags; Recovery of forest floor in areas where stocking is reduced below 30% Crown Closure

TYPE OF MONITORING: Implementation or Effectiveness

METHODS/PARAMETERS: Establish photo points and monitor changes in color and texture of vegetation and forest floor at yearly intervals.

FREQUENCY/DURATION: Implementation—Before sale operations begin, both summer and winter seasons. Effectiveness—yearly for five years. 3 year intervals after the first five years.

PROJECTED COSTS: Implementation—$300. Effectiveness—$600

REPORTING PROCEDURES: Forest Monitoring Report and or Project File

RESPONSIBILITY: District Ranger and Zone Landscape Architect.
VISUAL RESOURCES

OBJECTIVE: Maintenance and/or enhancement of immediate foreground views adjacent to trails, roads, and summer recreation sites.

ITEMS TO MONITOR: Removal of less than 3" slash from immediate foreground, and replanting and reseeding of disrupted areas from slash pile burning.

TYPE OF MONITORING: Implementation.

METHODS/PARAMETERS: On-site inspections while areas adjacent to trail corridors and recreation sites are being marked to help determine best choices to protect visual quality and character. On-site inspections of trail corridors and recreation sites at the end of slash disposal to ensure that area is meeting visual quality objectives.

FREQUENCY/DURATION: Implementation—On-site inspections while areas adjacent to trail corridors and summer recreation sites are being marked. On-site inspections at the end of slash clean-up period in each area.

PROJECTED COSTS: Implementation—$500.

REPORTING PROCEDURES: Forest Monitoring Report and/or Project File.

RESPONSIBILITY: District Ranger and Zone Landscape Architect.

SPECIAL USES

Monitoring relating to Special Use permits will be done as part of the special use administration and in the process outlined in the timber sale contracts. Contractual requirements will be monitored with special emphasis placed on protecting improvements and maintaining recreational events.

SOCIAL ECONOMIC

Monitor T&PIR's Report for sales associated with this analysis.

VEGETATION

OBJECTIVE: Monitor stand structure to determine if the alternative implemented met projections stated in the document for stocking, beetle risk, vegetative structural stage distribution, old growth, and down course woody debris.

ITEMS TO MONITOR: Vegetative structure on treated stands.

TYPE OF MONITORING: Implementation and effectiveness.

METHODS/PARAMETERS: Current stand examination requirements.

FREQUENCY/DURATION: After follow-up activities are complete (within 5 years).

PROJECTED COSTS: 2 people for 8 days at $225/day = $1800.

REPORTED PROCEDURES: District stand examination.

RESPONSIBILITY: District Silviculturist, District Wildlife Biologist.

VEGETATION

OBJECTIVE: Monitor planted areas to assure meeting survival requirements for first and third years and stocking certification requirements in Silvicultural Prescription within 3 years. This includes monitoring for damage to seedlings caused by livestock, wildlife, or other causes.

ITEMS TO MONITOR: Planted areas.

TYPE OF MONITORING: Implementation and effectiveness.

METHODS/PARAMETERS: Field review before sale contract is complete to assure adequate slash clean-up and site preparation. Survival and stocking must meet #4 guidelines.

FREQUENCY/DURATION: One day before timber sale contract completion and at 1st and 3rd years after planting.

PROJECTED COSTS: 2 people for 3 days at $225/day = $675.

REPORTED PROCEDURES: R4 RMRS reporting forms.

RESPONSIBILITY: District Silviculturist, District Wildlife Biologist.
AIR QUALITY

OBJECTIVE: Meet Utah State and Federal Air Quality Standards.

ITEMS TO MONITOR: Clearing Index, wind direction and speed. Visuals at all smoke sensitive areas listed in Chapter Three.

TYPE OF MONITORING: Implementation

METHODS/PARAMETERS: FMO monitor visual quality at Brian Head and Cedar Breaks National Monument

FREQUENCY/DURATION: During Prescribed Fire activities.

PROJECTED COSTS: $1500

RESPONSIBILITY: Fire Management Officer

RANGE

OBJECTIVE: Monitor livestock grazing to determine if and when it will be excluded from aspen regeneration and conifer tree planting areas.

ITEMS TO MONITOR: Fuel loading prior to burning to determine if grazing should be excluded for one year prior to burning; and, height and abundance of regeneration to determine if grazing should be excluded or when it can resume. Grazing will be excluded by the use of herding or, if necessary, fencing.

TYPE OF MONITORING: One year prior to implementation in aspen burn areas and 3-5 years following aspen regeneration treatments and conifer seedling planting

METHODS/PARAMETERS: Occasional estimation by FMO prior to burning. R4 stocking exam in regenerated sites and ocular estimation.

FREQUENCY/DURATION: Prior to burning treatments and 3-5 years following treatments, annually if necessary. Include in annual operating plan for affected allotments.

PROJECTED COSTS: $1500 - cost of stocking exams included in vegetation monitoring.

RESPONSIBILITY: Fire Management Officer. Silviculturist, Range Management Specialist

FIRE / FUELS

OBJECTIVE: Monitor fuel loading and vegetation composition to determine if treatment by prescribed fire was effective and if further treatment is necessary.

ITEMS TO MONITOR: Fuel loading prior to burning to determine what prescription parameters and fuel consumption is necessary. Post fire monitoring to determine post fire fuel loading and how it fits into natural fire patterns and cycles.

TYPE OF MONITORING: Prior to implementation in burn areas and 3-5 years following aspen regeneration treatments and broadcast burns.

METHODS/PARAMETERS: Ocular estimation by FMO prior to burning. Down fuel loading transects where necessary. Fuel loading photos series and photo points.

FREQUENCY/DURATION: Prior to burning treatments and 1-2 years following treatments.

PROJECTED COSTS: $4500 - cost of down woody transects and photo points.

RESPONSIBILITY: Fire Management Officer. Fire Fuels Specialist

WILDLIFE

OBJECTIVE: Assess effectiveness of road closures in order to learn the most effective methods for future closures.

TO MONITOR: Monitor road closures one and five years after implementation.

TYPE OF MONITORING: Implementation and effectiveness.

METHODS/PARAMETERS: Visually inspect road closures for evidence of violations of the closures.

FREQUENCY/DURATION: Monitor one and five years after implementation.

PROJECTED COSTS: Year 1 =  Wages for two days and vehicle costs = Year 1 $400. Year 2 = Same plus inflation = $435. TOTAL COST $835

REPORTING PROCEDURES: Document findings and label photographs. Note type of closure (gate, earthen barrier, sign) and type of violation (driving over the closure, removal of the barrier or sign, driving around closure, etc.). Take photographs of closures to document the most effective and ineffective type of closures.

RESPONSIBILITY: Zone Wildlife Biologist
WILDLIFE

OBJECTIVE: Determine effectiveness of signing and or painting snags to prevent fuelwood cutters from cutting and removing them and thereby maintain wildlife habitat and use productivity.

ITEM TO MONITOR: Snags that are signed and or painted and snags unsigned or painted.

TYPE OF MONITORING: Effectiveness.

METHODS/PARAMETERS: Select 5-10% of the project area for monitoring. Select areas for monitoring along roads where access is easy for fuelwood cutters and areas more difficult. Document on maps or aerial photos the locations of snags marked with signs or paint and some control snags of the same size that are not marked with paint or signs. Monitor trees still standing, trees felled and trees removed by cutting in year one and year five.

FREQUENCY/DURATION: Year one and year five after implementation (signing and or painting and mapping).

PROJECTED COSTS: $400 year one and $650 year five.

REPORTING PROCEDURES: Document outcome of results in District files and project file after completion.

RESPONSIBILITY: Zone Wildlife Biologist.

WILDLIFE

OBJECTIVE: Determine if suitable goshawk habitat is occupied and find Nest Areas.

ITEM TO MONITOR: Goshawk suitable habitat.

TYPE OF MONITORING: Implementation.

METHODS/PARAMETERS: Region 4 Northern Goshawk protocol.

FREQUENCY/DURATION: Prior to harvest and or burning activities that would take place during the breeding season.

PROJECTED COSTS: $1,000 per year.

REPORTING PROCEDURES: Use Region 4 Northern Goshawk procedures.

RESPONSIBILITY: Zone Wildlife Biologist.

WILDLIFE

OBJECTIVE: Assess validity of conclusion that harvest and burning would increase grasses, forbs and shrubs.

TO MONITOR: Amount of grasses, forbs and shrubs.

TYPE OF MONITORING: Effectiveness.

METHODS/PARAMETERS: Linear transects and count hits of grass, forb, shrub by pacing.

FREQUENCY/DURATION: Monitor prior to treatments and after implementation.

PROJECTED COSTS: Year 1 = Wages for two days and vehicle costs = Year 1 $400. Year 2 = Same plus inflation = $435. TOTAL COST $835.

REPORTING PROCEDURES: Tally hits, summarize and compare.

RESPONSIBILITY: Zone Wildlife Biologist.

WILDLIFE

OBJECTIVE: Assess validity of conclusion that three-toed woodpeckers use harvest and burn treatment areas for foraging and not nesting.

TO MONITOR: Three-toed woodpecker use.

TYPE OF MONITORING: Validation.

METHODS/PARAMETERS: Use Three-toed woodpecker protocol.

FREQUENCY/DURATION: Monitor one and five years after implementation.

PROJECTED COSTS: Year 1 = Wages for two days and vehicle costs = Year 1 $400. Year 2 = Same plus inflation = $435. TOTAL COST $835.

REPORTING PROCEDURES: Summarize results and compare years.

RESPONSIBILITY: Zone Wildlife Biologist.
WILDLIFE

OBJECTIVE: Assess effectiveness of methods used to retain snags.

TO MONITOR: Average snags per acre and general distribution.

TYPE OF MONITORING: Effectiveness.

METHODS/PARAMETERS: Linear transects with plots. 25 acre each. Compare success of methods used in each area where different methods are used.

FREQUENCY/DURATION: Monitor after implementation has been completed.

PROJECTED COSTS: Year 1 = Wages for five days and vehicle costs = $1,200.

RECORDING PROCEDURES: Tally snags, evaluate success of methods and whether snag objectives were met.

RESPONSIBILITY: Zone Wildlife Biologist.
Figure: 2

Spruce Ecosystem Recovery Project
Proposed Action Treatment Summary

Legend

- Spruce Ecosystem Recovery Project
- Salvoage Treatment Areas
- Roadless
- Private Land
- Undeclared Fire Areas

Focus Area Boundary
Protected Areas
Gravel and Improved Roads
Proposed Road Construction
Trails
Defensible Fire Suppression Zones
Figure 3

Spruce Ecosystem Recovery Project
Alternative A Treatment Summary
Figure: 4

Spruce Ecosystem Recovery Project
Alternative B Treatment Summary
Appendix: 1

Spruce Ecosystem Recovery Project
Soil Type/Suitability Map

Prepared by USDA Forest Service
Dixie National Forest GIS Staff
Using ARCGIS GIS
July 1997

The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. This map was developed from sources of differing accuracy, accuracy only or certain units based on modeling or interpretation, incomplete, in error, being updated or reduced, etc.

Using GIS products for purposes other than those for which they were created, may yield erroneous or misleading results. The Forest Service reserves the right to correct, update, modify, or replace, GIS products without notification

For specific data source data and additional data information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah.

Legend

Spruce Ecosystem Recovery Project
Soil Type Units
Unsuitable Areas
Adequate Restocking cannot be adequately assured or irreversible damage to soils or watershed conditions may occur

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Appendix: 4

Spruce Ecosystem Recovery Project
Critical Watershed Areas

Prepared by USDA Forest Service
Dixie National Forest GIS Staff
Using ARC/INFO GIS
July 1997

Legend

- Project Area
- Riparian Habitat
- Conservation Areas
- Sensitive Aquifers
- Private Land
- Springs

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Appendix: 6

Spruce Ecosystem Recovery Project
Focus Area Location/Site Locator Map
Appendix: 7
Spruce Ecosystem Recovery Project
Canopy Closure

Prepared by USDA Forest Service
Dixie National Forest GIS Staff
Using ARC/INFO GIS
July 1997

The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accuracy only at certain scales, based on modeling or interpretation, incomplete with being created or recorded, etc.

Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace, GIS products without notification.

For specific data source data and/or additional digital information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah.
Appendix: 10C

Cedar City Ranger District

Spruce Ecosystem Recovery Project

Recreation Cumulative Effects Area

Legend

- Spruce Ecosystem Recovery Project
- Private Land
- Recreation Cumulative Effects Area

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Appendix: 10E
Cedar City Ranger District
Spruce Ecosystem Recovery Project
Range Cumulative Effects Area

Legend:
- Spruce Ecosystem Recovery Project
- Range Cumulative Effects Area
- Private Land
- Range Allotments

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### Appendix 10 h - Vegetation Management Activities

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<td>6000/2844</td>
<td>int</td>
<td>120/70</td>
<td>16.2/75</td>
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<tr>
<td>33</td>
<td>Luns Fork</td>
<td>1983</td>
<td>3300/9200</td>
<td>Salt</td>
<td>60/39</td>
<td></td>
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<tr>
<td>34</td>
<td>Lwander Creek</td>
<td>1978</td>
<td>350/225</td>
<td>Snow/sal</td>
<td>137/82</td>
<td>120/81</td>
<td>1.6/70</td>
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<td>35</td>
<td>Mauchoch</td>
<td>1996</td>
<td>45/2217</td>
<td>Snow/sal</td>
<td>150/90</td>
<td>150/90</td>
<td>9.0</td>
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<td>36</td>
<td>Midway Face</td>
<td></td>
<td>975/4755</td>
<td>Co-14, Pinto-19,</td>
<td></td>
<td>600/50</td>
<td>1.0/45</td>
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*Note: Best copy available.*
| Num | Sale Name/Project   | Decision Date | Analysis Acres | Total Trained Acres | Treatment Type | Reforestation Acres/year | Thinned Acres/Year | New Road Const. Miller/Year | Other KV | Spray/Flame Zone | Goback & F. Oval | MSD | Page Falcon | Veg | Range | Sex | Val | Air | Cobweb | Soil | Hydro/ Fish |
|-----|---------------------|---------------|----------------|--------------------|----------------|-------------------------|-------------------|--------------------------|---------|----------------|----------------|-----|------------|-----|--------|-----|------|-----|-------|------|--------|------|-----------|
| 37  | Miller Seep         | 1995          | 1050/55        | Int                | 50/99           | 0.5/85                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 38  |绕岩 Ridge          | 1995          | 2232           | 65/99              | Int             | 0.6/96                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 39  | 老北湾            | 1978          | 150            | 142/99             | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 40  | 老墩山湖           | 1995          | 2646           | 24/99              | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 41  | 老温克林          | 1995          | 495            | 45/99              | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 42  | 老路沿             | 1990          | 98             | 98/93              | Int             | 8.3/93                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 43  | 老德阳             | 1982          | 2315           | 152/93             | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  | X  |
| 44  | 老校学             | *             | 2620           | 800/99             | Or               | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 45  | 老燕山             | 1987          | 475            | 120/44             | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 46  | 老面山             | 1994          | 6192           | 118/95             | Int             | 6.5/96                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 47  | 老西山             | *             | 140            | Int                | 120/80                  | 30/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 48  | 老宿山             | *             | 1300           | 560/96             | Or               | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 49  | 老宿山             | *             | 1300           | 560/96             | Or               | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 50  | 老宿山             | *             | 1390           | 500/97             | Or               | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 51  | 老宿山             | *             | 2290           | 180/95             | Int             | 120/80                  |                   |                          | X  | X  | X  | X  | X  | X  | X  |
| 52  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 53  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 54  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 55  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 56  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 57  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 58  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 59  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 60  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |
| 61  | 老宿山             | 1990          | 4875           | 2570/92            | Int-4000, Group-150 ac | 152/95                  | 540/95                  | 94/95                  | X  | X  | X  | X  | X  | X  | X  |

*Pa-Patch Cut
CC-Clear cut
Ev-Even Aged
Gr-Group Selection
Imp Rec Site-Improved Recreation Site
Int-Intermediate
Int-Individual Tree
M-John
Un-Unswept Aged

Com-Commercial Precommercial Nest
Or-Overflow Removal
Para-Patch Cut Aspen
Pen-Precommercial Nest
Rip-Pre-Riparian Protection
Sal-Salvage
Su-Sustained Wood Cut
Tr-Implant
San-Sanitation

Big game. Mammals' turkey & northern flicker are included in all activities in the watershed.
Species included under "sweep fl" are 3 Todd Woodspecker blue grous