3.12 WILDLIFE (TERRESTRIAL)

GENERAL WILDLIFE – Affected Environment

Introduction

The information within Section 3.12 describes the existing habitat for and occurrences of wildlife within the U.S. Forest Service (USFS) portion of the Big Creek Watershed and describes the effects on wildlife species that would result under the different alternatives as described in Chapter 2. There are numerous species that occur on the Ogden Ranger District (USDA Forest Service 2003). The species selected for this analysis are management indicator species designated by the Revised Forest Plan; sensitive species designated by the Regional Forester; species which are listed (threatened, endangered, proposed, and candidates) under the Endangered Species Act; neotropical migratory birds which have been identified as priority species within the Utah Partners in Flight Avian Conservation Strategy and/or those identified by U.S. Fish and Wildlife Service (USFWS) as birds of conservation concern; species at risk which have been identified by the Wasatch-Cache National Forest (Species at Risk List revised February 23, 2004); and those species of public interest (e.g., elk) and/or those identified by the public during scoping.

In order to evaluate effects to wildlife, the entire effects section for each species should be examined. In many instances direct, indirect, and cumulative effects are interrelated and can not be clearly separated in the discussion, thus doing so would add to considerable replication throughout the wildlife section (e.g., tables evaluating road density are a compilation of past and present effects and the tables within the goshawk section consider past effects combined with the effects of each alternative).

Chapter 2 and the Vegetation (Forested), Section 3.9 discuss the different alternatives and describe various treatments. For the wildlife analysis, these treatments can be categorized into three basic types: treatments that promote the growth of young aspen seedlings/saplings; sagebrush treatments which create age-class and structural diversity in shrublands while stimulating grass/forb and young shrub growth; and conifer treatments which create age-class and structural diversity (e.g., early seral lodgepole pine stands) and create within stand diversity (e.g., creation of openings within spruce and fir stands). Section 3.3, Fire, Air Quality, and Herbicides discusses the use of chemicals for the treatment of sagebrush vegetation, including the effects to wildlife.

Within the wildlife analysis, properly functioning condition tables and discussion must be referenced for the existing condition, desired condition, and for each of the alternatives (see Vegetation, Section 3.9) to understand how the changes correspond to specific species habitats.

Table 3.12.1 displays the number of acres within each of the major vegetation types within the Big Creek area (also see Appendix A, Maps 2 and 3).

Table 3.12.1. Acres of the major vegetation types within the Big Creek Analysis Area.

Habitat Type *	Total Habitat Acres
Conifer Forest	5,401
Aspen Forest	1,575
Conifer/Aspen	1,258
Grass/Shrubland	8,004

* Conifer Forest consists of mixed conifer, lodgepole pine, spruce/fir, and Douglas-fir vegetation types; Grass/Shrubland consists of the sagebrush/grass vegetation type; Aspen Forest consists of the aspen and aspen/conifer vegetation types; and Conifer/Aspen consists of the conifer/aspen vegetation type.

Table 3.12.1A displays prescription types and acreages by alternative.

Table 3.12.1A. Prescription types and approximate acreages by alternative.

Prescription	% Veg Removal on Treated Acres	% Acres Treated	Alt. 1 Acres within Prescriptions	Alt. 1 Veg Removed (Acres)	Alt. 1 Acres OVERSTORY REMOVAL (i.e., similar to clearcut)	Alt. 1 Acres PARTIAL HARVEST	Alt. 3 Acres within Prescriptions	Alt. 3 Veg Removed (Acres)	Alt. 3 Acres OVERSTORY REMOVAL (i.e., similar to clearcut)	Alt. 3 Acres PARTIAL HARVEST
Clearcut	95	95	206	186	186		137	124	124	
Conifer Removal w/patch	95	95	27	24	24		27	24	24	
Conifer Removal followed by Fire	95	95	556	502	502		343	310	310	
Group Selection	10/95	60/20	256	64		64	183	46		46
Groups and Patches	95	20	150	29	14.5	14.5	0	0		
Irregular Shelterwood	33	95	71	22		22	211	66		66
IRSW with groups / patches	33/95	75/20	140	61	30.5	30.5	0	0		
Overstory Removals	40*	95	130	49	49		130	49	49	
Rx Fire / herb / mech	95	40	2,513	955	94 (portion forested)		2,469	938	89 (portion forested)	
Rx Fire mosaic	95	40	681	259	111 (portion forested)		681	259	111 (portion forested)	
Shelterwood Prep	33	95	32	10		10	9	3		3
Commercial Thin w/groups	33/95	75/20	38	17		17	0	0		
Timber Harvest Acres Subtotal			1,606	964			1,040	622		
Total Treated Acres			4,800	2,178	1,011	158	4,190	1,819	**707**	**115**

Effects Analysis Assumptions

To compare the environmental effects by alternative it was necessary to make these key assumptions. Additional timing restrictions and recommendations are discussed within the wildlife section.

- New temporary and roads for "administrative use only" will be constructed, but these roads will not be considered for public use (during or after harvest activities). Open road density will not change as part of this project (see USDA Forest Service 2007; Ogden Travel Plan SEIS and ROD for additional analysis regarding road density: Appendix B, Table 1{Watersheds Z, AB, AD, and AE} and Figure B1).
- Newly created temporary roads will be closed and rehabilitated, directly after completion of harvest activities to reduce impacts to wildlife.
- Newly created administrative use only roads will be gated (or closed by other means) directly after completion of harvest activities to reduce impacts to wildlife.
- Roads designated for "administrative use only" will have very limited motorized use after harvest activities are completed; thus little or no affect on wildlife species after project implementation. Some existing administrative use only roads will be opened temporarily to complete the harvest/treatment activities. Use of these roads for project implementation will be temporary (approximately two seasons within a specific area).
- All proposed timber harvest units will retain the required number of snags and amount woody debris as outlined by Revised Forest Plan Guideline G16. (USDA Forest Service 2003, page 4-42).
- Livestock grazing will be managed to allow recovery of vegetation conditions after vegetation treatment (see Revised Forest Plan Guideline G73). (USDA Forest Service 2003, page 4-52).
- Disruptive management activities in elk calving areas and elk spring use areas will be avoided from May 1 through June 30 (see Revised Forest Plan Guideline 29). (USDA Forest Service 2003, page 4-44).

The following indicators were used to compare effects to wildlife:

1) Acres of specific habitat and/or vegetation types treated/modified for select species.
2) Miles of new road construction within specific habitat and/or vegetation types for select species.
3) Distance of potential disturbance activities from nest sites/territories for select species such as the northern goshawk.
4) Changes in open road density by 6th order watershed.
5) Changes in elk patch size.

GENERAL WILDLIFE – Environmental Consequences

a. Alternative 2 – No Action Alternative

In general, for the No Action Alternative, diversity in age and structure would continue at lower than historic levels and many species dependent on early successional stages would continue to decline in abundance and distribution. Also, the aspen vegetation type would continue to decline in acreage with the conversion to conifer vegetation types; thus causing the further shift in species diversity and composition away from historical conditions.

BIG GAME SPECIES

Big game species that reside within the Big Creek Watershed include mule deer, elk, and moose. Information regarding game species is displayed by Utah Division of Wildlife Resources (UDWR) harvest unit. The Big Creek Watershed lies within the Cache Harvest Unit. Table 3.12.2 displays the

estimated numbers of animals and UDWR population objectives in the Cache Harvest Unit.

In 2006, UDWR changed its habitat value categories and definitions: critical, high, substantial, and limited value habitat are now categorized as crucial and substantial value habitat. Crucial value habitat is now the combination of critical value and high value habitat. *Crucial value habitat* is defined by UDWR as "habitat on which the local population of wildlife species depends for survival because there are no alternative ranges or habitats available. Crucial value habitat is essential to the life history requirements of a wildlife species. Degradation or unavailability of crucial value habitat will lead to significant declines in carrying capacity and/or numbers of the wildlife species in question." *Substantial value habitat* is defined by UDWR as "habitat that is used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question."

Table 3.12.2. Estimated numbers of animals and UDWR population objectives in the Cache Harvest Unit for deer, elk and moose.

Species	Population Objective	2006 Population Estimates
Deer	25,000	14,000
Elk	2,300	2,300
Moose	200	250

Information provided by Darren DeBloois UDWR Wildlife Biologist.

MULE DEER – Affected Environment

Mule deer habitat within the USFS portion of the Big Creek Watershed consists of approximately 16,369 acres of crucial value *summer* range (formerly high value summer habitat). No winter range occurs within the analysis area. The amount of and the quality of winter range is often the limiting factor for deer on most harvest units.

MULE DEER – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Treatments occurring within aspen, aspen/conifer, and conifer/aspen stands and those proposed within the shrublands will have the greatest beneficial affect for deer. Treatment within conifer habitats will produce some improvement in available forage, increase edge habitat, and in the near future increase hiding cover as regeneration matures. Both Alternative 1 and 3 will have positive beneficial effects to mule deer habitat in the long term. Directly after treatment (fire, herbicide, and mechanical) short-term negative effects would occur in forage availability, but these changes will be short lived (approximately one growing season or less) as vegetation recovers producing a surge in re-growth and increased nutritional value of emergent vegetation. Burning will rapidly recycle nutrients, which will become available through grass and forb species, thus increasing the plant nutritional value. Within shrubland habitat approximately 40% of the vegetation within the areas proposed for treatment will be affected; thus creating vegetation and age-class diversity throughout these areas. Treatment area mosaics will greatly increase habitat diversity and in forested habitat, treatment/harvest will create edge habitat. Mule deer prefer edge habitats due to their foraging and hiding cover values. Aspen re-growth will provide dense horizontal hiding cover and abundant nutritious forage simultaneously for several years. In addition to placing aspen re-growth

within foraging reach, understory plant abundance and species diversity are expected to increase.

Alternative 1 would treat approximately 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 1,005 within 2,646 acres of shrublands. Alternative 3 would treat approximately 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 993 within 2,615 acres of shrublands. In comparison among the alternatives, Alternative 1 would create greater amounts of young seral stage growth (aspen) than Alternative 3, while shrubland vegetation treatment amounts are essentially the same between action alternatives. Alternative 1 would have slightly greater benefits to deer than Alternative 3. The vegetation treatment may have short-term negative effects directly after implementation, but these effects would be short-lived and these projects would be benefical to deer summer habitat.

Also associated with these alternatives, additional road construction and/or opening of administrative use only routes would occur within deer summer range habitat. Any new route would be temporary and would not be open to the public during or after project implementation, thus limiting disturbance to activities associated with construction and harvest. The harvest activities and the temporary roads may have short-term effects by temporarily displacing deer when activities occur to areas with reduced disturbance; though displacement is usually very short in duration (hours or a few days depending on the duration and type of activity). Wisdom et al. (2004) found that recreational activities had little difference in the measurable response by deer and determined that only 6% to 11% of deer responded in a flight response within 100 meters of activity. Disturbance activities would have a very minor effect.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not make improvements to habitat conditions that would benefit mule deer.

c. Cumulative Effects

The area of influence for cumulative effects analysis is deer summer range habitat within the Cache Harvest Unit (UDWR). Because Alternatives 1 and 3 primarily benefit deer summer habitat, there would not be an incremental impact that would contribute to cumulative impacts. Livestock grazing can affect the recovery of the treatment areas; as described within the mitigation section, livestock will be managed to reduce these effects. In addition, Alternative 2 has no change to the existing condition.

ELK – Affected Environment

Elk habitat within the USFS portion of the Big Creek Watershed consists of 16,369 acres of crucial *summer* range (formerly high value habitat). No winter range occurs within the analysis area.

ELK – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Aspen and shrubland treatment areas are expected to benefit elk populations in essentially the same way

as deer, though elk will benefit more due to the increases in available grasses and forbs, which are generally utilized more by elk during the spring and summer time period.

Skovlin et al. (1989) found that the clearcut timber harvest method increased the abundance and variety of forage for elk, while surrounding unlogged stands provided suitable cover for resting and concealment. Clearcut harvest will provide for a greater abundance of forage species for 10 to 25 years as regenerating conifers assume dominance. For partial harvested stands (50% of the stand volume removed), they found an increase in forage, but the harvest did not promote the establishment of many preferred seral species for elk, thus these stands were less attractive as habitat than clearcuts or uncut stands. For an optimum mix of habitats for elk, a ratio of 40% cover to 60% forage has been developed (Thomas et al. 1979).

As part of the Ogden Travel Plan SEIS, the potential effects of forest roads and motorized trails to the elk were examined (USDA Forest Service 2007). The effects of disturbance on patch size (security cover) were displayed by buffering (1,000 meters) open roads and motorized trails. Some of the key elk summering habitat within the Ogden District is located within the Big Creek Watershed; two patches occur within the area: Pole Canyon and Spencer Basin. Table 3.12.3 and Appendix A, Map 9 – Patch Size Map displays patch size for elk.

Table 3.12.3. Patch size for elk.

Patch Name	Patch Size (Acres)*
Pole Canyon	2,545
Spencer Basin	1,889

*See analysis for Alternative 5 (see USDA Forest Service 2007; SEIS).

Skovlin et al. (1989) found a reduction of elk use due to human disturbance associated with road construction, layout preparation, and logging activities. Wisdom et al. (2004) found that elk distribution shifted substantially during timber harvest. Cole et al. (1997) found that restricting access to only administrative uses benefited elk. As specified in the beginning of the wildlife section, all newly created temporary roads and administrative use only roads will not be open to the public during timber sale operations to reduce additional human disturbance. In addition, the Revised Forest Plan Guideline 29 specifies to avoid disruptive management activities in elk calving areas and elk spring use areas from May 1 through June 30 (USDA Forest Service, p. 4-44).

Alternative 1 would treat approximately 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen and treat approximately 1,005 within 2,646 acres of shrublands. Alternative 3 would treat approximately 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen and treat approximately 993 within 2,615 acres of shrublands. In comparison among the alternatives, Alternative 1 would create greater amounts of young seral stage growth (aspen) than Alternative 3, while shrubland vegetation treatment amounts are essentially the same between action alternatives. Alternative 1 would have slightly greater benefits to elk than Alternative 3. The vegetation treatment may have short-term negative effects directly after implementation, but these effects would be short-lived and these projects would be benefitial to elk summer habitat.

Both Alternative 1 and 3 would create new temporary roads and open portions of administrative use only roads to access harvest units, which would affect the effectiveness of the Pole Canyon and Spencer Basin patches. These roads will not be considered for public use during or after harvest activities. The effects of this disturbance would be temporary in duration and would temporarily displace elk. Disturbance would occur in specific areas and not across the entire Big Creek area, since the harvest activities would

likely be divided into separate sales occurring at different times. Activities would not occur at the same time across the entire Big Creek Area, thus disturbance would be somewhat limited. Wisdom et al. (2004) found that disturbance associated with recreational activities have a substantial effect on elk behavior and that the reactions of elk were more pronounced during ATV and mountain biking activities, than those of horse-riding and hiking. Wisdom et al. (2004) determined that 62% of elk responded (flight response) within 100 meters of ATV activity; 43% of elk responded within 500 meters; and 25% of elk responded within 1,000 meters. Increases in movements and the displacement from foraging habitat can affect the elk's energy budget/reserves. In comparison of the alternatives, Alternative 1 would have a larger effect regarding disturbance and have a greater temporary effect on the effectiveness of both the Spencer Basin and Pole Canyon elk patches. Alternative 3 with slightly less harvest/treatment and road construction/use associated with the two patch areas, would have slightly less disturbance effects than Alternative 1 (this especially true for the southern portion of the Spencer Basin patch). Since, "open" road density will not change as part of this project, patch sizes will remain the same after implementation.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not make improvements to habitat conditions that would benefit elk. Alternative 2 is the existing condition, thus there would be no additional disturbance effects.

c. Cumulative Effects

The area of influence for cumulative effects analysis is elk summer range habitat within the Cache Harvest Unit (UDWR). Past, present, ongoing, and future activities such as livestock grazing, fire suppression, disturbance associated with roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5), and urbanization/development and activities associated with adjacent lands would add to cumulative impacts (for additional details refer to USDA Forest Service 2007; SEIS, cumulative effects analysis, Elk Summer Range Habitat within the Cache Harvest Unit, p. 4-21 through 4-23). Livestock grazing can affect the recovery of the treatment areas; as described within the mitigation section, livestock will be managed to reduce these effects. As specified earlier, the limiting factor for many elk populations is the availability of suitable winter range. Even though these activities may add to the cumulative impacts within elk summer habitat, the effects within summer range habitat are less of a factor than effects on winter habitat with regards to limiting the population, but do play a role regarding population levels. In addition, Alternative 2 has no change to the existing condition, while Alternatives 1 and 3 primarily have beneficial effects to elk summer habitat. Thus, there would not be impacts that would add to cumulative impacts related to vegetation/habitat (see patch size below).

Patch Size

As described earlier, roads and human activity can reduce habitat effectiveness for elk. Habitat effectiveness was analyzed for the Ogden Travel Plan SEIS by buffering (i.e., 1,000 meters each side) roads and motorized trails and evaluating the size and number of habitat patches that provide elk with areas of minimized disturbance (e.g., security cover). The analysis included buffering of USFS open roads and motorized trails and other primary routes (e.g., county roads and urbanization/streets along the front). Use of routes located adjacent to USFS (e.g., private lands) lands can be difficult to assess or determine their status. Routes which may be visible on aerial photos, in fact may be closed, gated, receive very limited use by the public, or be used on an irregular basis by a private land owner. On the other hand, some of these routes are likely receiving moderate-heavy use by ATVs and other motorized vehicles or will in the future. Routes which receive moderate-heavy use by ATVs and other motorized vehicles would influence the size of the patch on adjacent USFS lands. Thus, patch sizes associated with Pole

Canyon and Spencer Basin may be reduced in the number of total acres by activities occurring off forest. The greater amount of human influence identified within a watershed, the likelihood of greater effects of disturbance occurring within adjacent lands that could reduce elk patch size and reduce habitat effectiveness for elk. Comparing Figure B1 (USDA Forest Service 2007; SEIS: Appendix B) and Table 1 of Appendix B (column: Assessment of Human Influence) with this document Appendix A – Map 9 (elk patch size), most adjacent lands within the watersheds associated with the Big Creek area are ranked as having low human influence, thus the size of these patches would be less effected by adjacent disturbance activities which may reduce habitat effectiveness than those ranked as having moderate or high human influence. As discussed above, patch size could be influenced by off forest activities, thus these actions would add to the cumulative impacts affecting the effectiveness of elk patches.

No reasonable foreseeable future actions are planned that would add to the cumulative impacts affecting the effectiveness of elk patches. Alternatives 1 and 3 in combination with the past, present, ongoing, and reasonable foreseeable activities such as disturbance associated with roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5) and urbanization/development and activities associated with adjacent lands, these alternatives would have cumulative effects associated with elk patch size. Since the effects of these alternatives are temporary and elk populations are near or at UDWR population objectives for the harvest unit and numbers are largely managed by hunter harvest, these additional effects will not likely influence elk population numbers.

MOOSE – Affected Environment

Moose are yearlong residents moving little between summer and winter ranges. Habitat primarily used by moose includes riparian areas with plentiful willow browse and areas such as ridgelines with abundant mahogany shrubs. Moose concentrate heavily on browse species for a majority of their diet, thus young aspen saplings would be highly utilized.

MOOSE – Environmental Consequences

Aspen treatments are expected to benefit moose populations in essentially the same as deer and elk. See effects above described for deer (excluding sagebrush treatments).

GRAY WOLF – Affected Environment

Up until 2002, the last verified gray wolf taken within the State of Utah was in 1930. During the past several years, sightings of wolf-like animals have occurred in Utah. Many of these have been identified as wolf-dog hybrids (UDWR 2003). In 2002, a wolf from Yellowstone National Park was captured near the town of Morgan in northern Utah, southeast of Ogden. The animal was returned to Grand Teton National Park where it later rejoined its pack. In Utah, the gray wolf is not part of the US Fish and Wildlife Service experimental recovery effort being conducted in Wyoming, Idaho, and Montana. There has not been a breeding pair or a pack identified in Utah to date, only a dispersing animal. If wolves from the federal recovery areas enter Utah, they will receive protection under the Endangered Species Act. Wolves are not included in the list of threatened or endangered species for Rich County.

On February 27, 2008 the U.S. Fish and Wildlife Service published a Final Rule designating the northern Rocky Mountain population of gray wolf as a distinct population segment and removed the distinct population segment from the Federal list of endangered and threatened wildlife species. The northern Rocky Mountain population segment includes the Big Creek analysis area. (50 CFR Part 17, Federal Register Vol. 73, No. 39) In the northern portion of Utah, the wolf will likely become a USFS sensitive species upon delisting (wolves are not included in the list of Threatened or Endangered species for Rich

County-USFWS November 2007).

Studies have shown a strong negative relationship between higher road density and the presence of wolves (Claar et al. 1999). In the Midwest wolves were not present where road densities exceeded 0.58 km/km^2 (0.93 mile/mile^2) but in the Rocky Mountains wolves occurred in areas with higher road densities (e.g., the Ninemile area in Montana where road densities exceed 2.5 km/km^2 (4.02 mile/mile^2) (Claar et al. 1999). Roads with low human activity can provide travel corridors for wolves. Table 3.12.4 displays the miles of open road and motorized trail per square mile within sixth order watersheds within USFS managed lands for the Big Creek area (USDA Forest Service 2007; SEIS, Alternative 5). All of these watersheds displayed low human influence on adjacent non-USFS lands (see USDA Forest Service 2007; SEIS: Appendix B). Appendix A, Maps 4 and 5 displays the sixth order watersheds for the Big Creek Project area.

Table 3.12.4. Miles of open road and motorized trail per square mile within sixth order watersheds for the Big Creek Watershed (USFS Managed Lands Only).

Analysis Area Watershed	Miles of Open Road and Motorized Trail per Square Mile**
AD (Little Creek)	0.79
Z (Upper Big Creek)	0.44
AB (Lower Big Creek) (3.45 %*)	1.75
AE (Otter Creek) (3.23 %*)	2.07

*USFS managed lands are less than 5 % of this watershed.
**Information derived from Alternative 5 of the Ogden Travel Plan (USDA Forest Service 2007; SEIS).

GRAY WOLF – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Both Alternative 1 and 3 would create new temporary roads and open portions of administrative use only roads to access harvest units, which would temporarily increase road density. These roads will not be considered for public use during or after harvest activities. As part of this project, "open" road density will not change by alternative. The effects of this disturbance would be temporary in duration and would temporarily displace prey species such as elk. Disturbance would occur in specific areas and not across the entire Big Creek area, since the harvest activities would likely be divided into separate sales occurring at different times. In comparison of the alternatives, Alternative 1 would have a larger effect creating more new routes and utilizing a greater number of existing administrative use only routes than Alternative 3. Alternative 3 with less road construction/use would have slightly less disturbance effects than Alternative 1. The effects to the wolf would be related to the effects on their prey species such as deer, moose, and elk (see those respective sections).

b. Alternative 2 – No Action

1. Direct and Indirect Effects

Alternative 2 is the No Action Alternative, thus no temporary changes in road density.

c. Cumulative Effects

The effects to the wolf of the alternatives are related to the effects on their prey species such as deer, elk, and moose. Because Alternatives 1 and 3 primarily benefit deer, elk, and moose summer habitat, there would not be an incremental impact that would contribute to negative cumulative impacts (see those respective sections for greater details). Also, both Alternatives 1 and 3 would create new temporary roads and open portions of administrative use only roads to access harvest units, which would temporarily increase road density. These roads will not be considered for public use during or after harvest activities. As part of this project, "open" road density will not change by alternative.

MANAGEMENT INDICATOR SPECIES (WILDLIFE)

The Revised Forest Plan identified the goshawk (*Accipiter gentilis*), the snowshoe hare (*Lepus americanus*), and beaver (*Castor canadensis*) as "wildlife" management indicator species (USDA Forest Service 2003, p. J4-J5). National Forests, such as the Wasatch-Cache, that revised under earlier regulations and whose plan requires population monitoring or population surveys are required to comply with the Revised Forest Plan (USDA Forest Service 2003, p. 4-113).

The MIS section contains two sections for each MIS species: MIS Monitoring and Project Information. Additional MIS monitoring information is found in Management Indicator Species of the Wasatch-Cache National Forest, Version 2007-1 (USDA Forest Service 2007a).

NORTHERN GOSHAWK (Aspen, Conifer and Mixed Conifer) – Affected Environment

MIS Monitoring

The range of the northern goshawk is circumpolar. In the West it is found from Alaska through the Rocky Mountains to New Mexico. While all forested landscapes are used to some extent, certain forest cover types appear to be occupied by goshawks more than others (Graham et al. 1999). Cover types most often occupied by goshawks on the Wasatch-Cache, based on sightings and nest locations, are Engelmann spruce, subalpine fir, lodgepole pine and quaking aspen, in either single or mixed species forests. The population under consideration for MIS is Forest-wide.

Three components of a goshawk's home range have been identified including the nest area (approximately 30 acres), post fledging-family area (approximately 420 acres), and foraging area (approximately 5,400 acres). Goshawks nest in a wide variety of forest types including aspen, coniferous, and mixed conifer forests. It typically nests in mature and old forests.

The goshawk preys on large-to-medium-sized birds and mammals, which it captures on the ground, in trees, or in the air. Observations of foraging goshawks show that they hunt in many forest conditions. This opportunism suggests that the choice of foraging habitat by goshawks may be as closely tied to prey availability as to habitat structure and composition.

Specific habitat attributes used by these species include snags, downed logs and woody debris, large trees, herbaceous and shrubby understories, and a mixture of various forest vegetation structural stages.

It was concluded in the Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah that goshawk populations in Utah were viable. This conclusion was based on the findings of Graham et al. (1999) that good quality habitat is well distributed and connected throughout the state,

the absence of evidence of a population decline on National Forest System lands since 1991, and conclusions of the U.S Fish and Wildlife Service in their decision to not list the northern goshawk under the Endangered Species Act (Federal Register 1998).

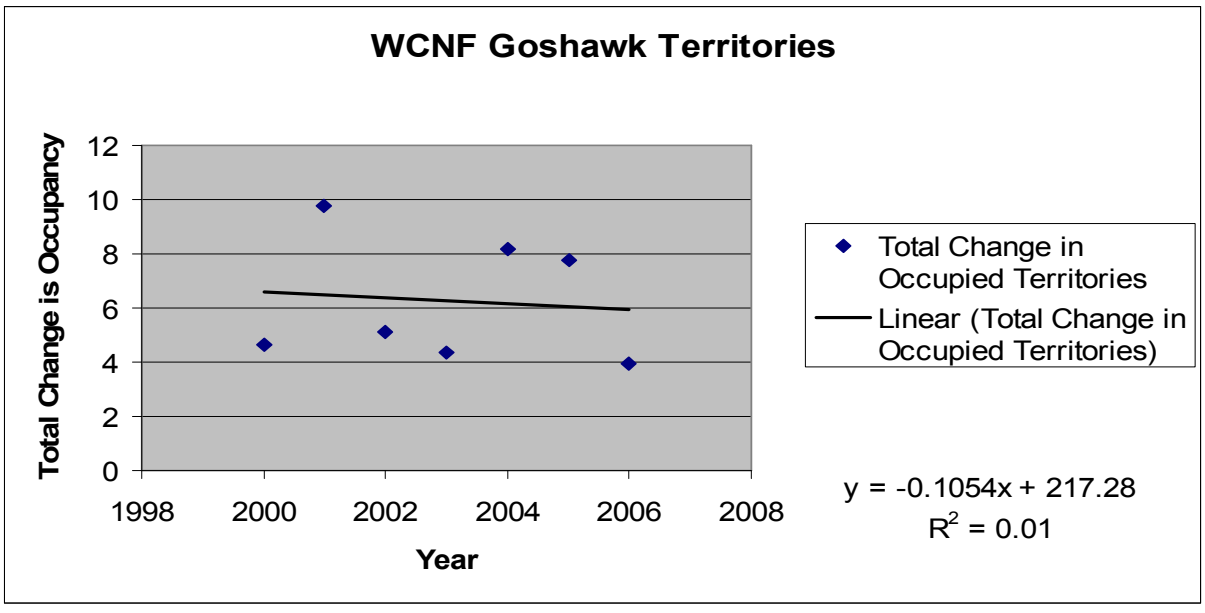
Territory occupancy has been monitored consistently on the Forest since 1999. Table 3.12.5 shows the results of that monitoring (USDA Forest Service 2007)

Table 3.12.5. Goshawk territories – Forest-wide.

Year	1999	2000	2001	2002	2003	2004	2005	2006
Number of Known Territories	29	31	34	35	45	51	50	54
Territories Monitored	20	31	23	33	41	36	48	46
Occupied Territories	7	7	11	14	16	22	20	21
Percent of Monitored Territories Occupied	35	23	48	42	35	61	49	46

When monitoring started in 1999, there were a total of 29 known territories on the Forest. In 1999, 20 of the known territories were surveyed of which 7 were observed as occupied. Every year a percentage of territories have been monitored and new territories found. The number of territories monitored in 1999 was divided by the number of territories monitored in the current year. This gave us the percent of territories monitored for occupancy each year compared to the baseline data. The change in occupancy was obtained by dividing the number of territories occupied by the number of territories monitored for the current year then multiplying the percent monitored for the year and the number of territories monitored in 1999. These calculations were completed for each district and a sum was taken to show the total change in occupancy for the Forest. Figure 3.12.4 shows the total change in territory occupancy from 1999 to 2006. The results are similar to the 2007-1 monitoring report and show a static trend in occupancy.

Figure 3.12.4. Total change in occupied goshawk territories on the Wasatch-Cache NF (USDA Forest Service 2007).



Year	1999	2000	2001	2002	2003	2004	2005	2006
Total Change in Occupied Territories[1]	7	4.66	9.76	5.09	4.33	8.18	7.775	3.97

[1]Sum of each Districts change in territory occupancy.

PROJECT INFORMATION

Within the Big Creek analysis area there are five known goshawk territories. Table 3.12.6 displays the monitoring history for each of these territories. Due to the sensitive nature of goshawk information, specific nest site information is contained within the planning record. In addition to being a Management Indicator Species, the goshawk is also a Forest Service Sensitive species.

Table 3.12.6. Goshawk territory history within the Big Creek Analysis Area.

Territory Name	Nests	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
OC	3-4		F2	I	I?	I?	I?	I?	F2	E	F2	F2	J	I	F?	I
PC	2-3	I	F2	owl	I/N	I/N	I/N	I/N	A?	F1	F2	I	I	I	I	F1
RW	2									F2	F2	F3	O/I	O/E	O/I	F3
SP	3?		I	I	X	X	A*	I	I	I	I	I	O/I	I	O/A	F1
DF	4														A/I	F2

O – Occupied Territory during predawn survey
A - Active Nest unknown number of fledglings ***** one dead young at base of tree
F –The documented number fledged (plus sign means additional may have been observed) **F?**- Uncertain number of fledglings.
I – Inactive **I?**- Uncertain from the records whether this territory was inactive or not visited.
I/N- Inactive for one or more nests/other nest not visited.
X – Not Surveyed
E – Nest active but failed.
A?- Active by some species of hawk
J – Juveniles observed within the territory.

Management Direction

The Revised Forest Plan (USDA Forest Service 2003) standards and guidelines that apply to this project are listed in Chapter 1, Tables 1.7.1 and 1.7.2. The Revised Forest Plan identifies specific standards and guidelines for the northern goshawk (S12 and G15).

Appendix I (page I-3) of the Revised Forest Plan specifies additional Species Conservation Guidance Sources: The Utah Northern Goshawk Project, Decision Notice, Finding of No Significant Impact, Finding of Non-significant Amendment (USDA Forest Service 2000) and The Northern Goshawk in Utah: Habitat Assessment and Management Recommendations (Graham et al. 1999).

Appendix X of the Revised Forest Plan (USDA Forest Service 2003) provides implementation guidance for northern goshawk. The most applicable guidance for this project is:

- Identify two alternate and three replacement nest areas per active territory. Each nest area should be 30 acres in size.
- Alternate nest areas should be located in suitable habitat with similar vegetation structure as the active nest area.
- Replacement nest areas should be located in habitat which will develop similar vegetative structures as the active nest area at the time when the active and alternate nest areas are projected to no longer provide adequate nesting habitat.
- Within PFAs, management activities should be restricted during the active nesting period (March 1 to

30 September).
- Plan the transportation system to minimize disturbance to PFAs.

Following a site-specific analysis of the project area, the following additional conservation guidance has been recommended for this project area:
- Vegetation treatments designed to maintain or promote a VSS 4, 5, and/or 6 group (mature and old age classes) should typically range from 40-70% in the foraging area and within the post-fledging area.
- Planned vegetative management treatments in mature and/or old structural groups in a landscape that is at or below the desired percentage of land area in mature and old structural stages (40% conifer, 30% aspen), should be designed to maintain or enhance the characteristics of these structural stages and treatments should not move them out of the mature and old structural stage.
- Forest manipulation within active, alternate, and replacement nest areas should be designed to maintain or improve desired nest area habitat.

Greenwald et al. (2005) reviewed several goshawk habitat studies and found that goshawks selected habitats in the home range with structural characteristics of mature to old-growth forests (e.g., large trees and high canopy closure). Their review suggests that goshawks are selecting forests for their structure rather than for species composition and stands were not selected with the greatest prey abundance. It was inconclusive in their review whether natural openings, edges, and stand diversity were or were not selected. They concluded that habitat selection patterns suggest that current goshawk management plans in the western United States may be inadequate. They concluded that recommendations for nest areas and post-fledging areas developed by Reynolds et al. (1992) continue to be supported in the literature, but the recommendations for the home range appear to lack support in research since 1992. They stated from their review that they could not assess whether 40% of the landscape in mature and old forests is sufficient to sustain goshawks. They specify that recent research in Arizona supports the conclusion that removal of forest cover results in reduced occupancy and thus reduced overall productivity since there were fewer occupied breeding territories.

Beier et al (2008) evaluated goshawk reproduction in ponderosa pine forests in relationship to the guidelines developed by Reynolds et al 1992 for the southwestern U.S. Within ponderosa pine forests, they found "a moderate negative correlation between goshawk productivity and the forest structure prescribed by the guidelines." They did not find a correlation with the resemblance of the breeding area to preferred foraging habitat nor resemblance to presettlement forest conditions with goshawk reproduction. It is uncertain whether their findings would be similar within other forest vegetation types; ponderosa pine forests do not occur within the project area.

Background Information for Goshawk Analysis

Several different types of existing harvest units occur within the Big Creek project area (e.g., partial, ITM, clearcut, and selective harvest). For assessing whether the foraging area (6,000 acres) meets the additional conservation guidance to maintain 40 to 70% VSS 4+, stands were classified as clearcut or similar type harvest units (VSS 1-3), if they were clearcut or resembled a condition with very little forest overstory (e.g., some of the past partial harvest); those types of harvest which did not substantially change the overstory stand density were classified as partial harvest (e.g., selective harvest and ITM).

Table 3.12.7 displays proposed harvest/treatment grouped into three categories: types which remove most of the overstory (**BOLD**), types which remove only a portion of the overstory trees (*ITALICS*), and the shrubland treatments. The proposed treatment types which remove most of the overstory trees are Clearcut, Conifer Removal w/patch, Conifer Removal w/fire, and Overstory Removal/Clearcut. Overstory Removal/Clearcut occurs in stands or portion of stands which have had prior harvest; if a considerable

amount of the overstory was removed already these stands have been factored in as past clearcut or similar type harvest. Since patch cuts resemble small clearcuts (removal of the overstory is 1 acre or greater in size) a portion of these treatment types are categorized as clearcut. In Table 3.12.7, treatments in "**bold**" text are harvest types which would remove most or all of the overstory. Treatment types which remove only a portion of the canopy cover are considered as partial harvest. These are Irregular Shelterwood (IRSW) preparation cut, Shelterwood preparation cut, and Group selection. In Table 3.12.7, treatments in "*italic*" text are those types of harvest which do not substantially change the overstory stand density/cover (See Reynolds et al. 1992, page 28 regarding canopy cover for various forest types and VSS classes (i.e., 40 to 60% canopy cover). The mosaic fire treatment includes both forested and shrubland vegetation within the area of treatment. Since treatment is proposed to occur within only 40% of the treatment area, the acres displayed in parenthesis are 40% of the total forested acres within the foraging area. In most instances, the prescribed fire/herb/mechanical treatment occurs only within shrublands though in some instances small pockets or stringers of trees occur within these areas. These small pockets or stringers may be affected when prescribed burning is used as the treatment method. Since treatment is proposed to occur on only 40% of the proposed treatment area, the acres displayed in parenthesis are 40% of the total acres proposed for treatment within the foraging area. Prescribed fire within aspen and aspen/conifer stands restores and regenerates aspen, creating young aspen stands across the landscape. Treatment of aspen, will create dense young aspen stands and should be valuable as snowshoe hare and grouse habitat. Prescribed fire likely benefits prey species of the goshawk. See the snowshoe hare section for additional information regarding effects of the alternatives.

Herbers and Klenner (2004) found that red squirrel abundance displayed little response to Douglas-fir *partial harvest* initially (approximately 2 to 4 years) after harvest likely due to the storage of cones in food caches, but following this time squirrel abundance declined with the intensity of tree removal. The clearcut harvest method removes most if not all conebearing trees, thus reducing squirrel habitat to nearly little or no value until trees begin cone production. Herbers and Klenner also found that chipmunk abundance increased by 700% following 50 to 63% tree removal, though the increase in the number of chipmunks did not offset the loss in red squirrel numbers. Red squirrel numbers would likely continue to be lower than the unharvested stand until the newly established trees would begin producing cones. Within approximately 40 to 60 years, cone production would likely return to preharvest conditions. Partial harvest also tends to cause the release (increased growth) of the remaining trees in some instances which may cause an increase of cone production in the remaining trees. Table 3.12.7 and 3.12.9 display the amount of the PFA and Foraging area affected by past timber harvest and by each of the alternatives.

Nest Areas

For each of the five territories, no timber harvest is proposed within the active *(most recently known active nest area)* nest area (S12 – USDA Forest Service 2003; p. 4-39) or within each of the two alternate nest areas per territory (goshawk conservation guidance), except within the DF territory in Alternative 1. These nest areas have been identified on maps within the planning record and consist of mature or old forest having structural characteristic of typical goshawk nesting habitat. Annual monitoring will occur to determine occupancy and location of active nest sites/nest areas in all goshawk territories in which the proposed project could affect the nest areas or post fledging area. Goshawk conservation guidance also specifies to identify three replacement nest areas in habitat which will develop similar vegetative structures as the active nest area at the time when the active and alternate nest areas are projected to no longer provide adequate nesting habitat. For each territory, three replacement territories have been identified. For some of the territories, timber harvest does occur within the replacement nest areas. Additional details are described in the effects by alternative.

Post-Fledging Area (PFA)

An area of 600 acres of forested habitat has been identified for each post-fledging area (PFA) (includes the six nest areas: 420 acres plus six 30 acre nest areas) (goshawk conservation guidance). Table 3.12.7

identifies existing and proposed activities by alternative within each of the goshawk PFAs. Goshawk conservation guidance specifies, "Within PFAs, management activities should be restricted during the active nesting period (March 1 to 30 September)." To prevent or to minimize disturbance this guidance will apply to all alternatives for all PFAs with the exceptions described below within the territory discussions. These exceptions are for proposed activities of limited disturbance potential (small amount of harvest) on the very edge of a PFA or when topography provides a large barrier to mask activities and a large amount of undisturbed forested habitat is available outside of the PFA. Additional goshawk conservation guidance specifies that 40 to 70% of the PFA should be in VSS classes 4-6 (maintained or promoted). All alternatives would maintain greater than 70% mature and old forest within each PFA. Goshawk conservation guidance specifies, to plan the transportation system to minimize disturbance to PFAs. Table 3.12.8 displays the miles of new temporary or new administrative use only roads within each PFA by alternative. Also, the table displays the existing administrative use only routes used for harvest activities.

Table 3.12.7. Existing and proposed activities by alternative within each of the goshawk PFAs.

PFA *	Existing Harvest** within PFA	Alternative 1	Alternative 3
OC	92 acres of clearcut or similar type harvest 25 acres of partial type harvest	**Conifer Removal/Fire: 18 acres** *IRSW prep w/**patches**: 93 **(19)** acres* *Comm. Thin w/groups: 38 acres*	**Conifer Removal/Fire: 18 acres** *IRSW prep: 93 acres*
PC	1 acre of clearcut or similar type harvest	**Clearcut: 9 acres** Mosaic Fire (shrub cover): 24 (8) acres	**Clearcut: 9 acres** Mosaic Fire (shrub cover): 24 (8) acres
RW	200 acres of partial type harvest	*Groups and **Patches:** 59 **(12***)** acres* *Groups: 29 acres*	NONE
SP	15 acres of clearcut or similar type harvest 101 acres of partial type harvest	*Groups: 66 acres*	*Groups: 66 acres*
DF	27 acres of partial type harvest	**Conifer Removal/Fire: 14 acres** *Groups and **Patches**:27 **(5***)** acres* **Prescribed Fire (forest cover):** 19 **(7)** acres**** *Groups: 29 acres* Prescribed Fire (shrub cover): 35 (14) acres****	**Prescribed Fire (forest cover):** 19 **(7)** acres**** Prescribed Fire (shrub cover): 35 (14) acres****

Bold are harvest types that would remove most or all of the overstory.

Italics are those types of harvest that do not substantially change the overstory stand density/cover.

* The effects within Post-Fledging Areas (PFA) and Nest Areas are assessed by utilizing 600 acres (includes nest areas) of forested habitat with characteristics desirable as goshawk habitat centralized around the nest sites excluding all non-USFS lands.

** Several different types of harvest units occur within the Big Creek project area (e.g., partial, ITM, clearcut, and selective harvest). For assessing whether the PFA (600 acres) meets the additional conservation guidance to maintain 40-70% in VSS 4+, stands were classified as clearcut or similar type harvest units (VSS 1-3) if they were clearcut or resembled a condition with very little forest overstory (e.g., some of the past partial harvest); those types of harvest which did not substantially change the overstory stand density were classified as partial harvest (e.g., selective harvest and ITM).
*** This includes the number of acres of both group and patch cuts.
**** The mosaic burn and prescribed fire/herb/mech categories consist of the treatment of 40% of the total area identified for treatment.

Table 3.12.8. Proposed new temporary roads and existing administrative use only roads to be utilized within goshawk post-fledging areas (PFA) by alternative*.

PFA	Alternative 1	Alternative 3
OC	1.2 miles of new road Use of administrative road system: 20228 Old Canyon Basin Gated 2.5 miles within the PFA	1.0 miles of new road Use of administrative road system: 20228 Old Canyon Basin Gated 1.75 miles within the PFA
PC	No new roads Use of administrative road system: 20186 Green Fork Gated 0.26 miles within the PFA	No new roads Use of administrative road system: 20186 Green Fork Gated 0.26 miles within the PFA
RW	1.3 miles of new road Use of 0.24 miles of Travel Plan closed road	No new roads
SP	0.13 miles of new road Use of administrative road system: 20103 Spencer Basin Gated 0.35 miles within the PFA	0.13 miles of new road Use of administrative road system: 20103 Spencer Basin Gated 0.35 miles within the PFA
DF	0.5 miles of new road	No new roads

* Goshawk conservation guidance specifies, "Within PFAs, management activities should be restricted during the active nesting period (March 1 to 30 September)." Guidance specifies, to plan the transportation system to minimize disturbance to PFAs.

Table 3.12.9. Existing and proposed activities by alternative within each of the goshawk foraging areas.

TERRITORY/ FORAGING AREA	Past Harvest* within the Foraging Area (Existing Condition)	Alternative 1	Alternative 3
OC	344 acres of clearcut or similar type harvest 396 acres of partial harvest	**Conifer Removal/Fire: 118 acres** **Overstory Removal w/patches:** 103 **(30) acres**** *IRSW prep* ***w/patches****: 109* ***(22) acres*** **Prescribed Fire (forest cover):** 124 **(50)** acres*** *IRSW prep: 71 acres* *IRSW prep w/groups: 30 acres* *Shelterwood prep: 23 acres* *Commercial thin w/groups: 38 acres* *Groups: 92 acres* Prescribed Fire (shrub cover): 306 (123) acres***	**Conifer Removal/Fire: 118 acres** **Overstory Removal w/patches:** 103 **(30) acres**** **Prescribed Fire (forest cover):** 124 **(50)** acres*** *IRSW prep: 211 acres* *Groups: 92 acres* Prescribed Fire (shrub cover): 306 (123) acres***
PC	270 acres of clearcut or similar type harvest 60 acres of partial harvest	**Clearcut: 83 acres** **Conifer Removal/Fire: 26 acres** **Overstory Removal and Clearcut: 27 acres** *Groups and* ***Patches****: 60* ***(12****)* *acres* **Mosaic Fire (forest cover):** 214 **(86)** acres **Prescribed Fire (forest cover):** 48 **(19)** acres*** *IRSW prep* **w/patches***: 52* **(10)** *acres* *IRSW prep w/groups: 30 acres* *Shelterwood prep: 9 acres* *Commercial thin w/groups: 38 acres* Mosaic Fire (shrub cover): 359 (144) acres Prescribed Fire (shrub cover): 169 (68) acres***	**Clearcut: 82 acres** **Conifer Removal/Fire: 26 acres** **Overstory Removal and Clearcut: 27 acres** **Mosaic Fire (forest cover):** 214 **(86)** acres **Prescribed Fire (forest cover):** 48 **(19)** acres*** *IRSW prep: 82 acres* *Shelterwood prep: 9 acres* Mosaic Fire (shrub cover): 359 (144) acres Prescribed Fire (shrub cover): 169 (68) acres***
RW	29 acres of clearcut or similar type harvest 1286 acres of partial harvest	**Clearcut: 20 acres** **Conifer Removal w/patch: 16 acres** **Conifer Removal/Fire: 251 acres** *Groups and* ***Patches****: 90* ***(18****)* *acres* **Prescribed Fire (forest cover):** 30 **(12)** acres***	**Conifer Removal w/patch: 16 acres** **Conifer Removal/Fire: 110 acres** **Prescribed Fire (forest cover):** 18 **(7)** acres*** *Groups:63 acres*

TERRITORY/ FORAGING AREA	Past Harvest* within the Foraging Area (Existing Condition)	Alternative 1	Alternative 3
		Groups: 105 acres Prescribed Fire (shrub cover): 180 (72) acres***	Prescribed Fire (shrub cover): 149 (60) acres***
SP	346 acres of clearcut or similar type harvest 714 acres of partial harvest	**Conifer Removal/Fire: 74 acres** **Overstory Removal w/patch:** 94 **(30) acres**** *IRSW prep w/**patches**: 11 **(2)** acres* *Shelterwood prep: 23 acres* *Groups: 136 acres*	**Conifer Removal/Fire: 74 acres** **Overstory Removal w/patch:** 94 **(30) acres**** *IRSW prep w/**patches**: 11 **(2)** acres* *Groups: 136 acres*
DF	193 acres of clearcut or similar type harvest 367 acres of partial harvest	**Clearcut: 20 acres** **Conifer Removal/Fire: 269 acres** *Groups and **Patches**: 90 **(18****)** acres* **Prescribed Fire (forest cover):** 143 **(57)** acres*** *IRSW prep: 71 acres* *Shelterwood prep: 23 acres* *Groups: 191 acres* Prescribed Fire (shrub cover): 1135 (454) acres***	**Conifer Removal/Fire: 56 acres** **Prescribed Fire (forest cover):** 134 **(54)** acres*** *IRSW prep: 71 acres* *Groups: 125 acres* Prescribed Fire (shrub cover): 1112 (445) acres***

Bold are harvest types that would remove most or all of the overstory.

Italics are those types of harvest that do not substantially change the overstory stand density/cover.

* Several different types of harvest units occur within the Big Creek project area (e.g., partial, ITM, clearcut, and selective harvest). For assessing whether the foraging area (6000 acres) meets the additional conservation guidance to maintain 40-70% in VSS 4+, stands were classified as clearcut or similar type harvest units (VSS 1-3) if they were clearcut or resembled a condition with very little forest overstory (e.g., some of the past partial harvest); those types of harvest which did not substantially change the overstory stand density were classified as partial harvest (e.g., selective harvest and ITM).

** Overstory Removal/ Clearcut occurs in stands or portion of stands which have had prior harvest; if a considerable amount of the overstory was removed already these stands have been factored in as a past clearcut or similar type harvest.

*** The mosaic burn and prescribed fire/herb/mech categories consist of the treatment of 40% of the total area identified for treatment.

**** This includes the number of acres of both group and patch cuts.

Foraging Area

Table 3.12.9 identifies existing and proposed activities by alternative within each of the goshawk foraging areas. Additional goshawk conservation guidance specifies that 40 to 70% of the foraging area should be in VSS classes 4-6 (maintained or promoted). Also additional goshawk conservation guidance specifies that planned vegetative management treatments in mature and/or old structural groups in a landscape that is at or below the desired percentage of land area in mature and old structural stages (40% conifer, 30% aspen), should be designed to maintain or enhance the characteristics of these structural stages and treatments should not move them out of the mature and old structural stage. Table 3.12.10 displays the mature forest acres and the percentage within each foraging area for the existing condition and by alternative within each of the goshawk foraging areas. All alternatives would maintain greater than 40% mature and old forest within each foraging area, except within the DF territory (additional details are described in the effects by alternative). In comparison of the action alternatives, Alternative 1 would treat a greater amount of forest acres within each of the goshawk foraging areas.

Table 3.12.10. Mature forest acres and percentages within goshawk foraging areas by alternative.**

MATURE FOREST ACRES WITHIN FORAGING AREAS BY ALTERNATIVE*	TERRITORY NAME				
	PC	RW	OC	SP	DF
Existing (Alt. 2) Mature Forest Acres/(Percentage)	3,533 (58.8)	4,650 (77.5)	3,779 (63)	3,420 (57)	2,335 (38.9)
Alternative 1 Mature Forest Acres/(Percentage)	3,270 (54.5)	4,333 (72.2)	3,559 (59.3)	3,314 (55.2)	1,971 (32.9)
Alternative 3 Mature Forest Acres/(Percentage)	3,296 (54.9)	4,517 (75.3)	3,581 (59.7)	3,314 (55.2)	2,225 (37.1)

* This table is based on the report: GOSHAWK AREA ANALYSIS FOR THE BIG CREEK PROJECT; this report discusses various assumptions made to calculate acres and is contained within the planning record. Only USFS lands were used to calculate acres. The effects within foraging area were assessed by utilizing a circle of 6000 acres. Only the proposed treatment types, which remove most of the overstory trees, are used to calculate the remaining old/mature forested habitat; partial harvest removes only a portion of the canopy cover (maintaining forest canopy) and is not used in this calculation.

** Summarized additional goshawk conservation guidance: Vegetation treatments designed to maintain or promote a VSS 4, 5, and/or 6 group (mature and old age classes) should typically range from 40-70% in the foraging area.

NORTHERN GOSHAWK – Environmental Consequences

a. Alternative 1 – Proposed Action

1. Direct and Indirect Effects

This alternative moves vegetation conditions toward properly functioning condition levels faster than Alternative 3; it would create additional openings and early successional stands which would improve prey abundance in the long-term but would reduce a greater amount of older/mature forest and overstory stand structure. This alternative proposes greater timber harvest and vegetation treatment than Alternative 3, thus having greater effects (disturbance and habitat changes) within most goshawk territories. This alternative would meet Revised Forest Plan Standard S12 by implementing timing restrictions within the active nest area for timber harvest and road construction. Guideline G15 specifies to design all management activities to maintain, restore, or protect desired goshawk and goshawk prey habitats including foraging, nesting, and movement. This alternative attempts to meet this guidance, but has specific effects which would not fully implement this guidance within certain goshawk territories. Also, this alternative would not meet some of the additional recommended goshawk conservation guidance.

Additional details are described below by territory.

PC Territory

This alternative would include treatment within 587 acres of forested habitat in the foraging area, of which 263 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 4.3% to 54.5%.

Within the post fledging area (PFA), a total of 9 acres of clearcut harvest is proposed. New roads are not proposed within the PFA for this alternative. Timing restrictions will not be placed on the clearcut harvest Unit 16 or on Road 20186 (existing administrative use only road) since both are located on the periphery of the PFA boundary. No treatment or road construction would occur within goshawk nest areas.

RW Territory

This alternative would include treatment within approximately 512 acres of forested habitat in the foraging area, of which approximately 317 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 5.3% to 72.2%.

Within the PFA, approximately 12 acres of group/patch cuts are proposed within an area of approximately 59 acres and 6 acres of group selection harvest within 29 acres. Within the PFA, 1.3 miles of new temporary road is proposed to be constructed along with the utilization of ¼ mile of closed road.

No treatment would occur within active or alternate goshawk nest areas but two replacement nest areas would have treatment (group/patch cut unit and group selection harvest unit) and road construction activities. Additional goshawk conservation guidance specifies that forest manipulation within active, alternate, and replacement nest areas should be designed to maintain or improve desired nest area habitat. Though understory removal methods could improve nest site conditions, patch cuts would create openings which would affect the overstory stand structure, thus reducing the effectiveness as a replacement nest stand for several decades. In addition, approximately ½ mile of new temporary road is proposed to be constructed within the replacement areas. For this territory, an additional replacement nest area (four total) has been identified within the PFA to compensate for effects of patch cuts within the one replacement area. Group selection within the second replacement nest area would likely negatively affect the stand structure and reduce the quality of the nest area initially. Being that it is a replacement area, stand structure may recover in the future to retain its effectiveness as a future nest area. Within this unit, to possibly mitigate the effects of harvest within the replacement nest area, group selection size will be minimized to the smallest practicable size and the width of the road will be minimized where possible (and/or skid trails be used in lieu of roads) in order to reduce the negative effects within the goshawk replacement nest area.

When active, timing restrictions will apply within the PFA (Units 32 and 33 and associated new road construction) to minimize disturbance to goshawks. Also, due to the location of the nests to existing open roads, hauling activities will be routed to avoid possible disturbance.

OC Territory

This alternative would include treatment within approximately 708 acres of forested habitat in the foraging area, of which approximately 220 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 3.7% to 59.3%.

Within the PFA, this alternative would include clearcut harvest or a similar type of treatment of approximately 37 acres and partial harvest within 112 acres. In addition, within the PFA, about 1.2 miles of new temporary road would be constructed and existing administrative use Road 20228 (approximately 2.5 miles) would be utilized for harvest activities.

No treatment would occur within active or alternate goshawk nest areas but three replacement nest areas would have treatment (irregular shelterwood (IRSW) prep cut with patches of approximately 93 acres) and road construction activities. Goshawk conservation guidance (see also G-15) specifies that forest manipulation within active, alternate, and replacement nest areas should be designed to maintain or improve desired nest area habitat. Though understory removal methods could improve nest site conditions, such as an IRSW prep cut, incorporating patches would create openings which would negatively affect the overstory stand structure and substantially reduce its effectiveness for replacement nest area(s) habitat for several decades. In addition, with the patch cut harvest, road construction within the IRSW cut area would further reduce overstory canopy which would negatively effect the quality of the stand as replacement nesting habitat.

Within this unit, to possibly mitigate the effects of harvest within the replacement nest areas, patch cut size will be minimized to the smallest practicable size and the width of the road will be minimized where possible (and/or skid trails be used in lieu of roads) in order to reduce the negative effects within the goshawk replacement nest area.

When active, timing restrictions will apply within the PFA (conifer removal with fire Unit 20, IRSW prep cut with patches Unit 18, commercial thin with groups Unit 19, and new road construction) and use of Road 20228 to minimize disturbance to goshawks.

SP Territory

This alternative would include treatment within approximately 338 acres of forested habitat in the foraging area, of which 106 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 1.8% to 55.2%.

Within the PFA, this alternative would partial harvest within approximately 66 acres, treating approximately 13 acres by group selection. In addition, within the PFA, 0.13 miles of new temporary road is proposed for construction and existing administrative use Road 20103 would be utilized for harvest activities.

Due to the topographic features of the landscape within this goshawk PFA, timing restrictions will be variable depending on the active nest area location. If the 2006 nest area is utilized no timing restrictions will occur on Road 20103 (existing administrative use only road) or the new road construction or harvest units (both within and adjacent to the PFA) associated with Road 20103. If the nest area utilized in 2004 is active, timing restrictions will occur on all harvest (two group selection Units 25 and 26 and a shelterwood Unit 24), Road 20103, and new road construction activities associated with Road 20103.

No treatment or road construction would occur within goshawk nest areas. An old historic nest area proposed for harvest was not identified as an altenate or replacement nest area due to sparce stand characteristics.

DF Territory

This alternative would include treatment within approximately 807 acres of forested habitat in the foraging area, of which about 364 acres would be a harvest/treatment method that removes the

majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 6% to 32.9%.

Forteen percent (353 acres of aspen and aspen/conifer) of the forested habitat within the foraging area consists of the aspen vegetation type. Additional goshawk conservation guidance specifies that planned vegetative management treatments in mature and/or old structural groups in a landscape that is at or below the desired percentage of land area in mature and old structural stages (40% conifer, 30% aspen), should be designed to maintain or enhance the characteristics of these structural stages and treatments should not move them out of the mature and old structural stage. Considering the mixture of both aspen and conifer forest within the foraging area, the guidance suggests that a minimum of 2,316 acres of mature/old should be retained. Also, considering other ownership within the foraging area (approximately ¼ of 1,078 acres of private/state/BLM land is unharvested forested lands) the guidance would not be met in this alternative.

With the limited amount of existing mature/old forest habitat within the foraging area, with the addition of a 6% reduction of mature/old forest habitat, this alternative could reduce goshawk productivity and could cause the abandonment of the DF territory.

Within the PFA, this alternative would include clearcut harvest or a similar type of treatment of approximately 26 acres and partial harvest within 29 acres. The group selection harvest is proposed within approximately 29 acres occurs within the most recently active and an alternate goshawk nest area. The harvest unit boundary is within approximately 440 to 510 feet of the existing nests, with one alternate nest occurring within the proposed harvest unit. To reduce effects to this nest, no timber harvest would occur within 300 feet of this nest. Vegetation treatment or timber harvest is not precluded by the standards or guidelines within nest areas. This alternative would meet Revised Forest Plan Standard S12 by implementing timing restrictions within the active nest area for timber harvest and road construction. Additional goshawk conservation guidance (also see G-15) specifies that forest manipulation within active, alternate, and replacement nest areas should be designed to maintain or improve desired nest area habitat. Though understory removal methods could improve nest site conditions, group selection harvest within nest areas would likely negatively affect the stand structure and reduce the quality of the nest area. In addition, ½ mile of new temporary road is proposed for construction within the PFA and a portion of the alternate nest area and most recently active nest area. The road construction would create a large narrow linear opening in the forest canopy and thus, negatively affect conditions within both the recently active nest area and an alternate nest area. Within this unit, to partially mitigate the effects of harvest within the active and alternate nest areas, group selection size will be minimized to the smallest practicable size and the width of the road will be minimized where possible (and/or skid trails be used in lieu of roads) in order to reduce the negative effects within the goshawk nest areas. Modification/alteration of the nest area stand structure may cause abandonment of the most recently active nest area to a new location.

When active, timing restrictions will apply within the PFA and adjacent to along with the prescribed fire unit's northern boundary (Unit 35) restricting motorized activities involved with line preparation and implementation, harvest activities within the group selection Unit 34, and within the group with patches Unit 33, and all new road construction activities in order to minimize effects to goshawks. Timing restrictions will not be placed on the conifer removal with fire harvest/treatment unit, since it is in the periphery of the PFA.

b. Alternative 3 – Reduced Treatment and Wildlife Emphasis

1. Direct and Indirect Effects

Effects have been partially mitigated by incorporation of the requirement of the sale administrator and road engineer coordinating sale activities and road construction prior to each season's operational period with a wildlife biologist to have updated location nest site data in order to avoid disturbance to goshawk nest areas and post fledgling areas.

This alternative provides balance: maintaining older/mature forest and overstory stand structure while also creating openings and early successional stands to improve prey abundance and create a mosaic of habitat conditions. This alternative proposes less timber harvest and vegetation treatment than Alternative 1, thus reducing the effects (disturbance and habitat changes) within most goshawk territories and providing further protection. This alternative would meet Revised Forest Plan Standard S12, since no timber harvest or road construction is planned within active nest areas. Guideline G15 specifies to design all management activities to maintain, restore, or protect desired goshawk and goshawk prey habitats including foraging, nesting, and movement. This alternative strives to meet this guidance, but has specific effects which would not fully implement this guidance within a few instances. Also, this alternative would implement most of the goshawk conservation guidance. Additional details are described by territory:

PC Territory

This alternative would include treatment within approximately 488 acres of forested habitat in the foraging area, of which about 240 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 3.9% to 54.9%.

Within the post fledging area (PFA), a total of approximately 9 acres of clearcut harvest is proposed. New roads are not proposed within the PFA. Timing restrictions will not be placed on the clearcut harvest Unit 16 or on Road 20186 (existing administrative use only road) since both are located on the periphery of the PFA boundary. No treatment or road construction would occur within goshawk nest areas.

RW Territory

This alternative would include treatment within approximately 207 acres of forested habitat in the foraging area, of which about 133 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 2.2% to 75.3%.

No treatment or new road construction would occur within the PFA or within goshawk nest areas.

OC Territory

This alternative would include treatment within approximately 648 acres of forested habitat in the foraging area, of which about 198 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 3.3% to 59.7%.

Within the PFA, this alternative would include clearcut harvest or a similar type of treatment of approximately 18 acres and partial harvest within about 93 acres. Within the PFA, one mile of new temporary road would be constructed and existing administrative use Road 20228 (approximately 1.75 miles) would be used for harvest activities.

No treatment would occur within active or alternate goshawk nest areas but three replacement nest areas would have treatment (IRSW prep cut of 93 acres) and road construction activities. The IRSW prep cut would likely create an improved stand for future replacement nest areas with larger trees and

a more open understory. Road construction within the IRSW cut area would create openings which may negatively effect the quality of the stand as replacement nesting habitat.

Within this unit, to possibly mitigate the effects of harvest within the replacement nest area, group selection size will be minimized to the smallest practicable size and the width of the road will be minimized where possible (and/or skid trails be used in lieu of roads) in order to reduce the negative effects within the goshawk replacement nest area.

When active, timing restrictions will apply within the PFA (conifer removal with fire Unit 20, IRSW prep cut Unit 18, and new road construction) and use of Road 20228 to minimize disturbance to goshawks.

SP Territory

This alternative would include treatment within approximately 315 acres of forested habitat in the foraging area, of which about 106 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 1.8% to 55.2%.

Within the PFA, this alternative would partial harvest within approximately 66 acres, treating approximately 13 acres by group selection. In addition, within the PFA, 0.13 miles of new temporary road is proposed to be constructed and existing administrative use Road 20103 would be utilized for harvest activities.

Due to the topographic features of the landscape within this goshawk PFA, timing restrictions will be variable depending on the active nest area location. If the 2006 nest area is utilized no timing restrictions will occur on Road 20103 (existing administrative use only road) or the new road construction or harvest units (both within and adjacent to the PFA) associated with Road 20103. If the nest area utilized in 2004 is active, timing restrictions will occur on all harvest (two group selection Units 25 and 26), Road 20103, and new road construction activities associated with Road 20103.

No treatment or road construction would occur within goshawk nest areas. An old historic nest area proposed for harvest was not identified as an altenate or replacement nest area due to sparce stand characteristics.

DF Territory

This alternative would include treatment within approximately 386 acres of forested habitat in the foraging area, of which about 110 acres would be a harvest/treatment method that removes the majority of the overstory. This would reduce the percentage of mature/old forest within the foraging area by 1.8% to 37.1%.

Fourteen percent (353 acres of aspen and aspen/conifer; not including conifer/aspen) of the forested habitat within the foraging area consists of the aspen vegetation type. Goshawk conservation guidance specifies that planned vegetative management treatments in mature and/or old structural groups in a landscape that is at or below the desired percentage of land area in mature and old structural stages (40% conifer, 30% aspen), should be designed to maintain or enhance the characteristics of these structural stages and treatments should not move them out of the mature and old structural stage. Considering the mixture of both aspen and conifer forest within the foraging area, the guidance suggests that a minimum of 2,316 acres of mature/old should be retained. Considering other ownership within the foraging area (approximately ¼ of 1,078 acres of private/state/BLM land is unharvested forested lands) the guidance would be met in this alternative. Finally, the conifer removal with fire portion of this alternative is planned to occur in the periphery of the FA in order to

retain greater amounts of old/mature habitat near the PFA and nest areas.

Within the PFA, a total of about 7 acres of prescribed fire in forested habitat is proposed. New roads are not proposed within the PFA. No treatment or road construction would occur within the identified goshawk nest areas.

When active, timing restrictions will apply within the PFA (and adjacent to) along the prescribed fire unit's northern boundary restricting motorized activities involved with line preparation and implementation in order to minimize effects to goshawks.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for the goshawk is the area within each of the goshawk post fledgling areas (PFAs) and within the foraging areas for those goshawk territories associated with the Big Creek area. The discussion below is split into two sections: cumulative impacts within the PFAs and within the foraging areas.

Post Fledging Areas (PFAs)
The *other past, present, or ongoing activities* which may have an influence on goshawks and their habitats within PFAs are roads and motorized trails, livestock grazing, timber harvest, fire suppression, and urbanization/development and activities associated with adjacent lands. Other activities specified within Table 3.1.1 either do not occur within PFA or would likely have very small or very limited effects to PFAs (e.g., natural fire, prescribed fire, gravel pits) or would likely have very small or very limited effects to PFAs (e.g., road maintenance, riparian fences, and dispersed recreation use/camping). All nest areas and PFAs were identified/designed within USFS managed lands (i.e., other ownership was not included for nest areas or PFAs).

Roads and Motorized Trails
No changes would occur from the existing travel plan (Ogden Travel Plan SEIS) in the location or miles of "open" roads or motorized trails within the goshawk PFA's. Temporary routes would be construction and administrative use only routes utilized for the Big Creek project; these are discussed above by alternative and by PFA. Any new route would be temporary and would not be open to the public during or after project implementation. Thus, the milage of "open" road will not change from those displayed for Alternative 5 within Table 4.6.6 of the Ogden Travel Plan SEIS (USDA Forest Service 2007). In addition, to reduce potential disturbance related to Alternatives 1 and 3, timing restrictions for timber harvest activities and road construction would be in place as described above within active nest areas and PFAs. These actions will minimize the potential effects of disturbance to goshawks within these PFAs.

The effects associated with the Ogden Travel Plan decision in combination with the proposed actions within respective post fledging areas are as follows:

OC Post Fledging Area
The Ogden Travel Plan decision would add existing road miles within the OC goshawk PFA. Since activity would occur on the outer edge of the PFA, and this disturbance currently occurs from an existing unauthorized route, effects are not likely to affect productivity or cause abandonment. Therefore, there would be no cumulative effects in this area.

SP Post Fledgling Area
The Ogden Travel Plan decision would increase road and motorized trail miles within the SP PFA, primarily from the conversion of an existing administrative use only route to motorized trail and a motorized ridgeline trail, mostly within the sagebrush vegetation type. The disturbance related to this could reduce productivity or possibly cause the abandonment of the SP territory.

Implementation of the Ogden Travel Plan and Alternative 1 or 3 will not result in a cumulative effect because depending on which of the nests are utilized, mitigation will be in place. Mitigation includes possible timing restrictions and coordination of sale activities and road construction prior to each season's operational period with a wildlife biologist as described in direct and indirect effects.

RW Post Fledging Area
The Ogden Travel Plan decision opens the Curtis Ridge Trail to motorized use, which may increase motorized effects associated within the RW PFA in the future. Due to the closeness of existing nests to the existing road, increased use could cause disturbance of these nests and affect productivity.

Implementation of the Ogden Travel Plan and Alternative 1 or 3 will not result in a cumulative effect because depending on which of the nests are utilized, mitigation will be in place. Mitigation includes possible timing restrictions and coordination of sale activities and road construction prior to each season's operational period with a wildlife biologist as described in direct and indirect effects.

Livestock/Grazing Management can affect goshawks by removing cover and food for prey species and can affect aspen regeneration (Graham et al. 1999). In addition, grazing can have negative effects by altering the structure and species composition (grasses, forbs, and shrubs) of aspen stands, which changes goshawk foraging habitat (Graham et al. 1999; Reynolds et al. 1992). Past and current livestock management has likely reduced the amount of prey available to goshawks due to alternations in vegetation within portions of the PFAs. A majority of goshawk PFA habitat consists of conifer stands, which are not capable lands for livestock grazing, thus are not utilized by livestock. Livestock grazing on the Ogden Ranger District occurs primarily within the western portion of the district. Livestock/grazing management may add to the cumulative impacts within a portion of the PFAs.

Timber Harvest
Past timber harvest activities have occurred within all the PFAs and are displayed within Table 3.12.9. All alternatives would maintain greater than 70% mature and old forest within each PFA.

Past partial harvest activities may have influenced the occupancy of two SP historic nest sites by altering nest stand conditions and/or associated disturbance activities. These activities occurred prior to the establishment of standards and guidelines for the management of goshawks. Numerous alternate nest stands are available within the territory, some which have been utilized since the occurrence of harvest activities within the SPB territory. Past activities within the PFA may have influenced the location of current nest sites and effected past nest success, but are not likely affecting current nest success. Past timber harvest within USFS managed lands has likely benefited goshawk prey species (e.g., see the snowshoe hare section). Past harvest has created greater age class and structural diversity within the landscape and thus increased the diversity and abundance of prey species for the goshawk. Most of these harvested stands are greater than 15 years old, thus currently providing near optimum habitat for snowshoe hares. This action has primarily had a beneficial effect, though some of the past activities may add to the cumulative impacts within goshawk PFAs.

Fire Suppression has reduced the presence of early successional vegetation classes within goshawk habitat and has likely reduced the abundance of prey available to goshawks associated with these nest sites, though fire suppression has also likely retained old and mature habitat utilized as nest sites. Fire suppression has had both beneficial and negative effects, thus it may add to the cumulative impacts.

Urbanization/Development and Activities Associated with Adjacent Lands
The effects to goshawk habitat associated with the Ogden Ranger District would be limited to "forested" habitat directly adjacent to or part of a circular PFA; thus primarily limiting activities to livestock grazing,

timber harvest, and a variety of motorized and non-motorized recreational activities. Lands of other ownership are associated with all the PFAs. The effects of livestock grazing are similar to those described above. Also "all" open roads (USFS, state, county, and private roads) and motorized trails were used for the analysis of effects within goshawk PFAs within the Ogden Travel Plan SEIS, thus displaying the effect of routes of other ownership within these PFAs (USDA Forest Service 2007). See above discussion for roads and motorized trails.

At the OC PFA, past timber harvest activities on adjacent private lands may have caused the abandonment of a historic nest site on private lands to a nest sites on USFS lands. Most of the private lands associated with this PFA (only a small portion of the area) have had past timber harvest activities. Past activities on non-USFS lands associated with the PFA may have influenced the location of current nest sites and effected past nest success but are not likely affecting current nest success.

At the PC PFA (also referred to as the RF PFA), past timber harvest activities in 2002 on adjacent private lands (only a small portion of the area) in close proximity to one of the nest areas did not affect nest success; two juveniles fledged while harvest activities occurred. This activity may have possibly affected nest site use in the following years by altering adjacent stand structure. Past activities on non-USFS lands associated with the PFA may have influenced the occupancy of the territory but these disturbance activities are not currently occurring and numerous alternate nest stands are available within the territory.

Past timber harvest has created greater age-class and structural diversity, which has primarily had a beneficial effect, though some of the past activities may add to the cumulative impacts within goshawk PFAs.

Foraging Areas

The *other past, present, or ongoing activities*, which may have an influence on goshawks and their habitats within foraging areas, are livestock grazing, timber harvest, fire suppression, and urbanization/development and activities associated with adjacent lands. Other activities specified within Table 3.1.1 either do not occur within foraging area or would likely have very small or very limited effects to foraging areas (e.g., natural fire, prescribed fire, gravel pits, road maintenance, riparian fences, and dispersed recreation use/camping). Disturbance associated with roads and motorized trails within the foraging area (the portion outside of the PFA and nest areas) would not likely affect goshawks and the changes in vegetation condition within the foraging area due to roads and motorized trails associated with Alternative 5 of Ogden Travel Plan SEIS would be negligible and thus would not be significant or substantially affect foraging habitat (USDA Forest Service 2007).

Livestock/Grazing Management can affect goshawks by removing cover and food for prey species and can affect aspen regeneration (Graham et al. 1999). In addition, grazing can have negative effects by altering the structure and species composition (grasses, forbs, and shrubs) of aspen stands, which changes goshawk foraging habitat (Graham et al. 1999; Reynolds et al. 1992). Past and current livestock management has likely reduced the amount of prey available to goshawks due to alternations in vegetation within portions of the foraging areas. A majority of goshawk foraging area habitat consists of conifer stands, which are not capable lands for livestock grazing, thus are not utilized by livestock. Livestock/grazing management may add to the cumulative impacts within a portion of the foraging areas.

Timber Harvest

The majority of the forest type is old or mature, and the majority of harvest has been clearcutting of lodgepole pine or individual/group selection within fir types. Past timber harvest activities have occurred within the foraging areas and are displayed within Table 3.12.9. Past timber harvest activities have reduced the percentage of mature and old within the DF territory below levels recommended within goshawk conservation guidance. Goshawk conservation guidance specifies that planned vegetative

management treatments in mature and/or old structural groups in a landscape that is at or below the desired percentage of land area in mature and old structural stages (40% conifer, 30% aspen), should be designed to maintain or enhance the characteristics of these structural stages and treatments should not move them out of the mature and old structural stage. Considering the mixture of both aspen and conifer forest within the foraging area, the guideline suggests that a minimum of 2,316 acres of mature/old should be retained. Currently 2,335 acres (38.9 %) of mature/old forest occurs within the DF foraging area. Past timber harvest have reduced the amount of mature and old forest associated with each of the foraging areas, but has created greater age-class and structural diversity within the landscape and thus increased the diversity and abundance of prey species for the goshawk (see snowshoe hare section). Most of these harvested stands are greater than 15 years old, thus currently providing near optimum habitat for snowshoe hares. This action has primarily had a beneficial effect, though some of the past activities associated with the DF territory may add to the cumulative impacts.

Herbers and Klenner (2004) found that red squirrel abundance displayed little response to Douglas-fir *partial harvest* initially (approximately 2 to 4 years) after harvest likely due to the storage of cones in food caches, but following this time squirrel abundance declined with the intensity of tree removal. The clearcut harvest method removes most if not all conebearing tree, thus reducing squirrel habitat to nearly little or no value until trees begin cone production. Herbers and Klenner also found that chipmunk abundance increased by 700% following 50 to 63% tree removal, though the increase in the number of chipmunks did not offset the loss in red squirrel numbers. Red squirrel numbers would likely continue to be lower than the unharvested stand until the newly established trees would begin producing cones. Within approximately 40 to 60 years, cone production would likely return to preharvest conditions. Partial harvest also tends to cause the release (increased growth) of the remaining trees in some instances which may cause an increase of cone production in the remaining trees. Table 3.12.7 and 3.12.9 display the amount of the PFA and Foraging area affected by past timber harvest and by each of the alternatives.

Fire Suppression has reduced the presence of early successional vegetation classes within goshawk habitat and has likely reduced the abundance of prey available to goshawks associated with these territories, though fire suppression has also likely retained old and mature habitat utilized as nest sites. Fire suppression has had both beneficial and negative effects, thus it may add to the cumulative impacts.

Urbanization/Development and Activities Associated with Adjacent Lands
The effects to goshawk habitat associated with the Ogden Ranger District would be limited to "forested" habitat directly adjacent to or part of the foraging area; thus primarily limiting activities to livestock grazing and timber harvest (motorized and non-motorized recreational activities are discussed previously). The effects of livestock grazing are similar to those described previously. Lands of other ownership are associated with all the foraging areas. For the Big Creek analysis, lands of other ownership were not used to meet the required acres of VSS 4+ within the foraging area. Since it is unknown when or whether these private/state lands will be harvested, they have been subtracted from the total foraging area. This can also be viewed or considered as displaying the maximum effect (i.e., if these lands were entirely clearcut) within these lands. The acres of other ownership are displayed within the report: GOSHAWK AREA ANALYSIS FOR THE BIG CREEK PROJECT. Past and future activities on non-USFS lands associated with the foraging areas may reduce the portion of mature and old forest associated with each foraging area; as described above these effects are already considered within Table 3.12.10. As described previously, timber harvest can create greater age-class and structural diversity, which can have a beneficial effect with regard to goshawk prey species. Timber harvest activities within lands of other ownership may reduce the amount of mature and old with the foraging areas, but the additional goshawk conservation guidance would be met for maintaining mature/old forest for all alternatives and all territories, with the exception of the DF territory for harvest associated with Alternative 1. Alternative 1 does not meet the minimal requirements even with the inclusion of private/state/BLM lands in the total acres of mature/old. Alternative 3 would meet the additional goshawk conservation guidance for the DF

territory if future harvest is limited to 180 acres of the approximately 270 acres within private/state/BLM lands (approximately ¼ of 1,078 acres of private/state/BLM land is unharvested forested lands). Future timber harvest activities within private/state/BLM lands within the DF territory would add to the cumulative impacts associated with Alternative 1, further reducing the acres of mature/old forest below guidelines. For Alternative 3, future timber harvest activities within private/state/BLM lands within the DF territory may add to the cumulative effect. These cumulative effects could reduce goshawk productivity or cause the abandonment of the DF territory.

Finally, in combination with the past, present, and ongoing activities, Alternatives 1 and 3 have additional effects in varying degree to the goshawk nest areas, PFAs, and foraging areas. Overall, Alternative 1 has greater effects on goshawks than Alternative 3. Activities (e.g., temporary roads) associated with the Big Creek project may add to the cumulative effects of disturbance (noise and activity), but a combination of mitigation, timing restrictions, and adherence to standards and guidelines (and associated goshawk conservation guidance) will minimize additional effects within these PFAs. In combination with past treatments, vegetation treatments for the Big Creek alternatives may affect the occupancy of specific territories and/or affect productivity at specific nest sites, especially with regard to Alternative 1. These treatments will enhance goshawk prey habitat such as the snowshoe hare, allowing the habitat to support greater numbers of snowshoe hares within the project area in the future. The effect on these nest sites/territories will not likely influence the forest-wide trend in goshawk populations.

SNOWSHOE HARE (Pole/Sapling Aspen, Conifer and Mixed Conifer) – Affected Environment

MIS Monitoring

Snowshoe hares were selected as management indicators for pole/sapling aspen, conifer and mixed conifer. The snowshoe hare is a valuable prey species to the lynx, goshawk, and to other predators. In the Rocky Mountains and westward, hares mainly use coniferous forests in the higher mountainous areas. They are predominately associated with forests that have a well-developed understory that provides protection from predation and supplies them with food.

For snowshoe hares, the Wasatch-Cache National Forest has been divided into two separate populations (the Wasatch/Bear River Range and the Uinta Mountain "North Slope Range"). These two populations were identified because of the large habitat gap between mountain ranges essentially blocking interactions between the two populations.

The Wasatch/Bear River Range population consists of the Salt Lake, Ogden, and Logan Ranger Districts. The Uinta Mountain Range consists of the Mountain View, Evanston, and Kamas Ranger Districts.

In Northern Utah, a study was done in the Bear River Range on the Wasatch-Cache National Forest where snowshoe hare use was determined in different vegetation types (Wolfe 1982). Table 3.12.11 displays the associated hare density using information from Wolfe (1982) which was converted to hares/hectare by Hodges (2000).

Table 3.12.11. Snowshoe hare density by vegetation cover type (Wolfe 1982 and Hodges 2000).

Vegetation Type	Hares Per Hectare
Subalpine fir	0.99
Douglas-fir	0.57
Aspen dense understory	0.22
Aspen-conifer edge	0.17
Engelmann spruce	0.1
Aspen-sparse understory	0.01

Wasatch/Bear River Range

As part of the Revised Forest Plan monitoring effort for Management Indicator Species, snowshoe hare plots were established across the Forest. In 2003, two, six, and seven grids were established on the Salt Lake Ranger District (RD), Ogden RD, and the Logan RD, respectively. Each grid consists of 50 square meter sample points. The two grids established on the Salt Lake RD contain the following vegetation types: aspen/conifer and mixed conifer. The six grids established on the Ogden RD contain the following vegetation types: Spruce/fir, aspen/conifer, aspen, Douglas-fir, mixed conifer and mature lodgepole pine. The seven grids established on the Logan RD contain the following vegetation types: Spruce/fir, aspen/conifer, aspen, Douglas-fir, mixed conifer, mature lodgepole pine, and young/mid-age lodgepole pine. At each of the 50 sample points, the number of snowshoe hare pellets is tallied on an annual basis. On some surveys, individual sample points cannot be relocated (e.g., they are lost or stolen) and the sample size is less than 50. Those instances where the sample size is less than 50 are indicated in Table 3.12.12 as n=XX, where n is the number of sample points. Pellet counts have been used in many studies to infer snowshoe hare densities. Table 3.12.12 displays the results of pellet counts for 2004, 2005, and 2006 within each district.

Table 3.12.12. Snowshoe hare pellet counts for the Wasatch-Bear River population on the Wasatch-Cache National Forest (USDA Forest Service 2007).

District	Vegetation Type	Total Pellet Counts 2004	Total Pellet Counts 2005	Total Pellet Counts 2006
Ogden	Douglas-fir	409	459	527
Ogden	Mixed Conifer	354	361	286
Ogden	Aspen/Conifer or Conifer/Aspen	313	229 (n=49)	402 (n=49)
Ogden	Lodgepole Pine - Mature	216	184 (n=48)	158 (n=47)
Ogden	Spruce/Fir	41	17	50
Ogden	Aspen	1 (n=49)	0	0
Salt Lake	Mixed Conifer	252 (n=44)	650	337
Salt Lake	Aspen/Conifer or Conifer/Asp	106	155	92 (n=47)
Logan	Lodgepole Pine/Aspen – young/mid aged	583	863	406 (n=48)
Logan	Douglas-fir	147	85 (n=47)	18 (n=48)
Logan	Spruce/Fir	135	84	20
Logan	Aspen/Conifer or Conifer/Aspen	96	41 (n=49)	8 (n=28)
Logan	Mixed Conifer	53	111	168
Logan	Lodgepole Pine - Mature	52	183	47
Logan	Aspen	7 (n=48)	27 (n=49)	8

Table 3.12.13. Conservative and liberal estimates of hares per hectare based on the average pellets per plot between 2004 and 2006 for the Wasatch/Bear River Range.

	2004	2005	2006
Average Pellets per Plot	3.73	4.65	3.52
Conservative and Liberal Estimates (Hares/ha)	0.94-1.79	1.18-2.24	0.89-1.69

Figure 3.12.5. Conservative estimates of hares per hectare based on the average pellets per plot between 2004 and 2006 for the Wasatch/Bear River Range.

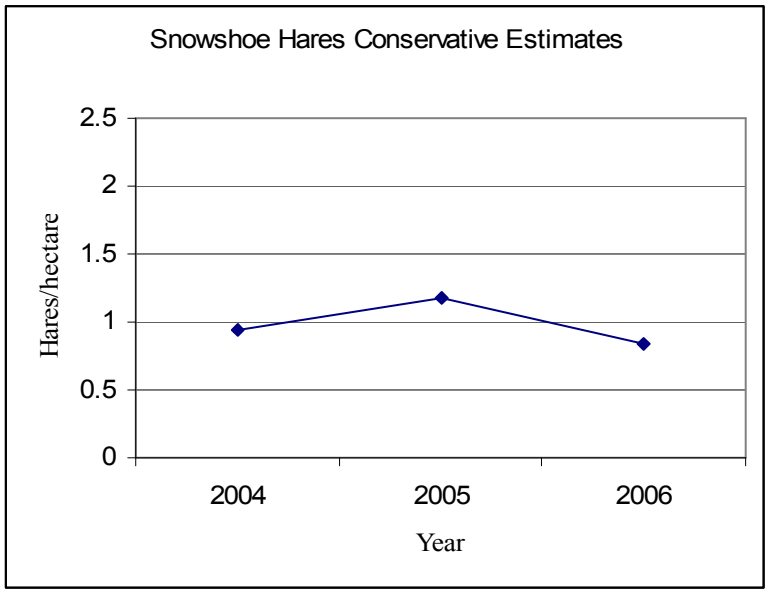


Table 3.12.13 and Figure 3.12.5 display the conservative and liberal estimates for hares per hectare based on the number of pellets per plot.

North Amazon Basin: Since 1998, Dennis Austin (UDWR-retired) and the USFS have been conducting snowshoe hare pellet surveys (sampling methods are not similar to those described above) in Amazon Basin on the Logan Ranger District. The pellet count data from North Amazon Basin suggests that the snowshoe hare population was stable or displayed very little change from the summer of 1998 thru the summer of 2001. From the summer/fall of 2001 the data suggests an increase in snowshoe hare numbers with the highest numbers so far occurring during August 2004 to July 2006 (the most recent survey). This pellet count data represents an increase of 34% between 2004 and 2005, which is similar to the 25% increase suggested by the USFS data (USDA Forest Service 2006 and 2007). Also, this pellet count data represents an increase of 3.1 % between 2005 and 2006.

Table 3.12.14. Snowshoe hare pellet counts in Amazon Basin 1999-2006.

YEAR	Mean Pellet Counts (100 m^2)	Converted Mean Pellet Counts (1 m^2)
1999	94.0	0.94
2000	29.5	0.30

YEAR	Mean Pellet Counts (100 m^2)	Converted Mean Pellet Counts (1 m^2)
2001	98.8	0.99
2002	562.9	5.63
2003	785.3	7.85
2004	657.9	6.58
2005	882.6	8.83
2006	910.4	9.10

NOTE: The table year represents the year in which the pellets were counted. The number of pellets counted reflects the presence of snowshoe hares over the past year. Plots 1-10 are averaged for this site.

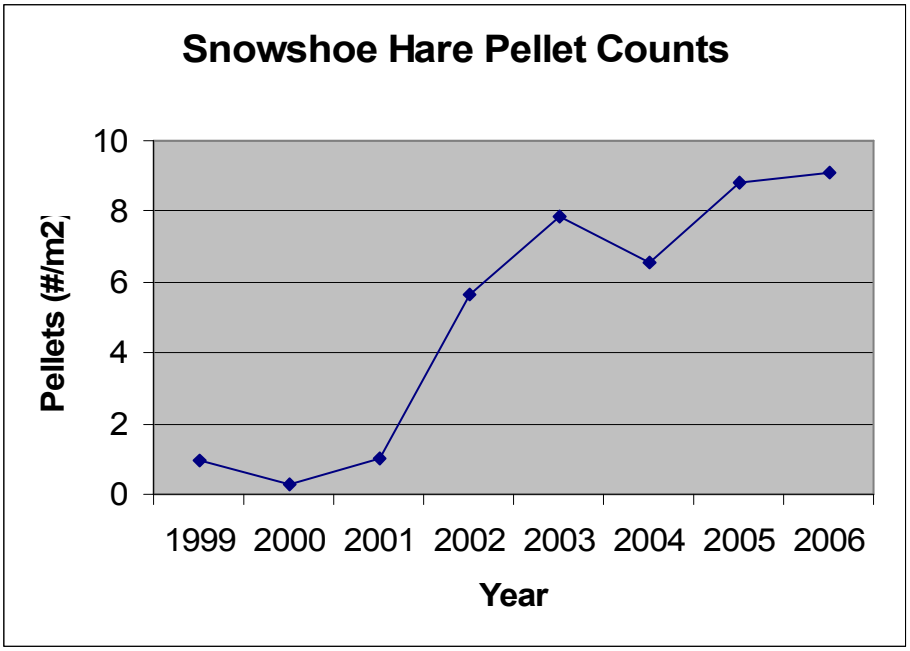


Figure 3.12.6. Snowshoe hare pellet count trend for North Amazon Basin.

Additional information regarding Revised Forest Plan monitoring and trend is contained within the 2007 Management Indicator Species of the Wasatch-Cache National Forest report.

PROJECT INFORMATION

As previously described, 15 grids were established within the Wasatch/Bear River Range (Salt Lake, Ogden, and Logan Ranger Districts). The grids contain the following vegetation types: spruce/fir, aspen/conifer, aspen, Douglas-fir, mixed conifer, mature lodgepole pine, and young/mid-age lodgepole pine. The lodgepole pine and mixed conifer grid sites are located within the analysis area, while the other Ogden sites are located in close proximity to the analysis area with the exception of the aspen grid site.

Dense horizontal cover of conifers, just above the snow surface is critical for snowshoe hare winter habitat and occurs either in regenerating stands or as an understory layer in older stands (Ruediger et al. 2000).

Even-aged Management: The clearcut harvest method utilized within the lodgepole pine stands initially will dramatically reduce (very little use) the value of the stand to snowshoe hares for approximately 15 years, though slash may provide cover and some forage directly after harvest. From a stand age of approximately 16 to 40 years, saplings and young pines will provide optimum cover and forage for snowshoe hares exceeding several times the value of a mature stand. At approximately 40 years of age (depending on site characteristics), the stand has returned to similar characteristics of a mature pine stand (reduced cover and forage), thus the value to snowshoe hares returns to approximately the same initial value as an uncut stand. Over a 100 year period, the value of a harvested (clearcut) lodgepole pine stand is 30% more valuable to snowshoe hares than a mature lodgepole pine stand over the same timeframe (information is based on Wasatch-Cache NF pellet count data). Table 3.12.15 displays the number of existing clearcut acres within specific age categories for snowshoe hares.

Table 3.12.15. Existing clearcut acres within the Big Creek Analysis Area categorized by within age groups.

	0-15 years old	16-40 years old	41 or greater years old
Acres of Clearcut Timber Harvest	26 acres	318 acres	84 acres

Uneven-aged management: Partial harvest methods typically treat small areas such as individual tree or group selection (essentially mimic gaps in the forest created by blowdown, disease, etc.) or harvest uniformly removing only a portion of the stand (e.g., understory removal). Uneven-aged management usually creates pockets of young growth within a stand of mature trees, which would be beneficial to snowshoe hares (both cover and forage within a stand of mature trees). Unlike even-aged management, there is only a slight reduction in the value of habitat to snowshoes hares directly after harvest, but there is not be the substantial gain either, though within approximately 15 years the stand is more valuable to snowshoe hares than the original untreated mature stand for approximately 25 years or more. Past partial harvest acres are displayed within Table 3.9.8 (also see Section 3.9, Vegetation (Forested)).

SNOWSHOE HARE – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Table 3.9.4 (Section 3.9, Vegetation (Forested)) displays by alternative the post treatment PFC distribution and the desired PFC condition. Alternatives 1 and 3 create age-class diversity within conifer and aspen vegetation types across the landscape, thus enhancing habitat for the snowshoe hare. Both action alternatives do this in varying degrees with Alternative 3 maintaining more old/mature forest, while Alternative 1 creates greater amounts of early seral vegetation conditions enhancing greater amounts of snowshoe hare habitat.

Table 3.12.16 displays the vegetation treatment acres within conifer and aspen associated with each alternative. Alternative 1 would treat approximately 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen and treat approximately 461 acres of conifer. Alternative 3 would treat approximately 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 355 acres of conifer. Alternative 1 would have slightly greater benefits to snowshoe hare habitat than Alternative 3.

Table 3.12.16. Approximate vegetation treatment acres by vegetation type and alternative.

COVER TYPE	Alternative 1	Alternative 3
Conifer Early Seral	461 acres	355 acres
Aspen Early Seral	732 acres	489 acres

As previously described, harvest/treatment methods within conifer stands which remove the majority of the overstory will have a short-term negative (0 to 10-15 years) effects on snowshoe hare habitat, then increase in value for approximately 25 years far exceeding the value of a mature stand, then returning to similar conditions and value of a mature stand. Stands which are partially harvested will have a slight reduction in the value of habitat to snowshoes hares directly after harvest, though within approximately 15 years the stand will be slightly more valuable to snowshoe hares than the original untreated mature stand for approximately 25 years or more. Prescribed fire is primarily planned to occur within aspen and aspen/conifer stands to restore and regenerate aspen and create young aspen stands across the landscape. Treatments such as conifer removal followed by fire will likely stimulate the increased growth of herbaceous plants beneficial to snowshoe hare and will result in more seedlings per acre especially regarding aspen and lodgepole pine. Based on the results of monitoring, mature pure aspen stands have very limited use by snowshoe hares. Aspen stands with conifers have much greater use by snowshoe hares. Treatment of aspen would create dense young aspen stands and should be valuable as snowshoe hare habitat providing both cover and forage (Wolfe et al. 1982).

Treatments that remove a majority of the overstory trees would equate to 1,011 acres and 707 acres within Alternatives 1 and 3 respectively.

In addition, these alternatives will construct additional temporary roads and open administrative use only routes within snowshoe habitat. These temporary routes will either be closed after use or be utilized for administrative use only. Also, many of the routes would be ripped and seeded after use, thus becoming quality snowshoe hare habitat in approximately 15 years. These temporary roads may have minor effects on snowshoe hare habitat, but the amount of proposed construction and the associated effects to snowshoe hares would be negligable in view of total habitat within the Ogden Ranger District and the differences between the action and no action alternatives would not be significant in relationship to the creation of these temporary routes.

As described above, vegetation treatments will have short-term (approximately 10 to 15 years) negative effects after implementation, but overall these treatments will enhance snowshoe hare habitat allowing for the habitat to support greater numbers of snowshoe hares within the project area in the future.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. With time, existing harvested stands within the project area will decline in value to snowshoe hares, returning to approximately pre-harvest values. This alternative would not make improvements to habitat conditions that would benefit the snowshoe hare.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for snowshoe hare is forested habitat (primarily conifer) within the Big Creek area (USFS lands) and within the associated inholdings and directly

adjacent forested lands of other ownership. Past, present, ongoing, and future activities such as livestock grazing, fire suppression, habitat modifications associated with roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5), and urbanization/development and activities associated with adjacent lands would add to cumulative impacts within the Big Creek area (for additional details refer to USDA Forest Service 2007; SEIS the cumulative effects analysis for the Snowshoe Hare {Big Creek Area Only}, p. 4-31 through 4-33). Even though these activities may add to the cumulative impacts within snowshoe hare habitat, Alternative 2 has no change to the existing condition, while Alternatives 1 and 3 would initially have negative effects to snowshoe hare habitat (after implementation for approximately 15 years), but overall would be benefitial to snowshoe hare habitat. Thus, these altenatives would add to the cumulative effect within snowshoe hare habitat initially, but would be a benefit to snowshoe hare in the long term reducing cumulative impacts.

Finally, the effects of the action alternatives would be small in comparison to the total acres of the Wasatch/Bear River Range. These treatments will enhance snowshoe hare habitat allowing the habitat to support greater numbers of snowshoe hares within the project area in the future and possibly influencing the trend (increasing the population) in snowshoe hare within a portion of the Wasatch/Bear River Range.

BEAVER (Riparian) – Affected Environment

MIS Monitoring

Beaver occur in permanent slow moving streams, ponds, small lakes, and reservoirs. They play an important role in maintaining and enhancing riparian and aquatic ecosystems (Olsen and Hubert 1994) and are important for the creation of habitat for several species of fish, big game, waterfowl, and neo-tropical birds. A beaver colony is typically about five to six beavers and consists of an adult pair, the present year young, and young of the previous year.

For beaver, the Wasatch-Cache National Forest has been divided into two separate populations (the Wasatch/Bear River Range and the Uinta Mountain "North Slope Range"). The Wasatch/Bear River Range population consists of the Salt Lake, Ogden, and Logan Ranger Districts. The Uinta Mountain Range consists of the Mountain View, Evanston, and Kamas Ranger Districts.

As part of the Revised Forest Plan monitoring effort for Management Indicator Species, square mile sections were surveyed across the forest. To achieve an unbiased, well-distributed sample, sample units were systematically selected sections (1 section = 1 m^2 = 640 acres). With a 10% sampling intensity, every 10^{th} section was sampled (the first section sampled was selected randomly, and then every 10^{th} section were systematically selected). Only complete sections of National Forest System lands are sampled. By surveying sections and recording the location of active dams, the number of colonies can be determined and converted into the number of beaver by using an average of 5 beaver per colony.

Information regarding the monitoring of the beaver sections for the entire Wasatch/Bear River Range for 2004 and 2005 are contained within the planning record. In the beaver section of the 2007 Report for Management Indicator Species of the Wasatch-Cache National Forest, additional information is provided regarding both populations (Wasatch/Bear River Range and the Uinta Mountain Range).

Tables 3.12.17 and 3.12.18 display the monitoring results and the estimated number of beaver per square mile within the Wasatch/Bear River Range (USDA Forest Service 2007). At the present time the Forest has only established baseline information for beaver populations.

Table 3.12.17. Wasatch/Bear River Range beaver monitoring results (baseline data: 2004-2005).

Ranger District	Number of Sections	Completed Sections Monitored	Sections Monitored with Active Dams	Sections with Old Activity, No New Activity	Sections with No Activity or Water Present
Salt Lake	14	14	1 (1 dam)	3	10
Ogden	17	17	3 (9 dams)	2	5
Logan	32	32	3 (20 dams)	5	15
Total	63	63	7 (30 dams)	10	30

Table 3.12.18. Beaver Population Estimates for the Wasatch/Bear River Range (baseline data: 2004-2005).

Population	Active Dams	Number of Colonies	Individuals	Estimated # of Beavers/mi^2
Wasatch/Bear River Range Population	30	7	35	0.55

UDWR DATA

Currently there are not enough years of Forest Service monitoring population data on beaver to indicate a trend. However, there are other source documents provided by the Utah Division of Wildlife Resources (UDWR) that currently indicate a trend. Several UDWR reports provide information regarding the historical beaver trends for the Forest: The 1979-1980 and 1998-1999 Furbearer Harvest Reports (State of Utah 1980, 1999 respectively) and the 1971-1982 Beaver Distribution, Habitat and Population Survey (published in 1993 Blackwell) provide relevant information on beaver.

The 1993 Blackwell report restates the trend from the 1979-1980 Report but calculates carrying capacity for each of the 52 beaver units in the state. Blackwell used beaver habitat data collected from 1971-1981 to determine the carrying capacity.

There are 11 trapping units that include some National Forest System lands administered by the Wasatch-Cache National Forest. The UDWR beaver units include all land ownerships.

Table 3.12.19. UDWR units occurring, at least partially, on NFS lands.

Unit	Unit Location	Status of Beaver Population 1981
Wasatch/Bear River Population		
2	North ½ Cache County	Static
3	Rich County	Static
5	South ½ Cache County	Static
6	West Weber County	Static
7	East Weber County	Static
8	Davis County	Static
9	Morgan County	Static
10	Northern ¾ Summit County	Static
11	Southern ¼ Summit County	Increasing
14	Southwest Salt Lake County	Static
15	Southeast Salt Lake County	Increasing

Source: UDWR 1971-1982 Beaver Distribution, Habitat and Population Survey (Published 1993).

With the exception of a few specific locations, Forest Service management of suitable beaver habitat within National Forest boundaries has not changed significantly from 1980 to the present (Table 3.12.19). Therefore, until Forest Service monitoring yields data for population trends, it is assumed that the determinations made in the State of Utah Survey Report remain valid for both populations on the Forest.

Additional information regarding Revised Forest Plan monitoring and trend is contained within the project record (USDA Forest Service 2007a).

PROJECT INFORMATION
Within the project area, there are very few streams or ponds, thus very limited amounts of beaver habitat. An analysis of the Ogden Ranger District was conducted for the presence of past beaver activities with the use of aerial photos for the following years: 1952/1953, 1981, and 2001 (Analysis of Beaver Activity on the Ogden Ranger District, June 2005). From this analysis, no beaver locations were identified within the project area (USFS lands). As part of the Revised Forest Plan MIS monitoring effort, square mile sections were surveyed for beaver. Within the Ogden Ranger District, 17 survey sections occur, with one section located within the Big Creek project area. The Lodgepole Reservoir section (also referred to as the Green Fork Reservoir section: Section 21) was surveyed in 2004 with the occurrence of old beaver activity (old cutoff stumps) (sections surveyed within the Ogden Ranger District in 2004/2005 and the results of these surveys are contained within the planning record). Within the project area boundary but within private land, beaver are or have been present in the recent years in the area called Basin Beaver Ponds (within Old Canyon Basin). Areas with potential are the tributaries of Big Creek such as Bobs Kiddy Hole, Randolph Creek, and Dry Fork Canyon.

BEAVER – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Treatments within forested habitat could increase water yield within the watersheds, thus possibly benefiting beaver by increasing potential beaver habitat. In addition, treatments within stands containing aspen (near sources of water) would increase available forage and reduce the loss of aspen through succession to conifer stands. Treatments within sagebrush shrublands would likely have no effect on beaver habitat. As described within the aquatics section, stream channels and other water sources are buffered to reduce effects to the aquatic environment. These mitigation measures would also benefit beaver habitat. Additional information regarding the effects to the aquatic environment is described within the aquatics section of the EIS. In comparison among the alternatives, Alternative 1 would create greater amounts of young seral stage growth (aspen) than Alternative 3. Alternative 1 would have slightly greater benefits to beaver than Alternative 3.

Due to the limited amount of permanent water sources within the project area, no substantial change in beaver population numbers is expected with implementation of any of the alternatives, and consequently, no effect on the population trend would occur.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

For Alternative 2, the aspen vegetation type would continue to decline in acreage with the conversion to conifer vegetation types.

c. Cumulative Effects

Due to the limited amount of permanent water sources within the project area (less than ½ mile of perennial water), the action alternatives would create greater amounts of young seral stage aspen growth

(beneficial), and the stream channels and other water sources are buffered to reduce effects, the actions of these alternatives in combination with other actions would not add to the cumulative impacts within beaver habitat. No substantial change in beaver population numbers is expected with implementation of any of the alternatives.

THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES (WILDLIFE SPECIES)

The U.S. Fish and Wildlife Services lists one Threatened (Canada lynx) and one Endangered (black-footed ferret) Species potentially occurring in Rich County. The Bald Eagle has recently been delisted and is now a USFS sensitive species.

The Big Creek Analysis Area is located within a portion of a wildlife corridor, which has regional importance in providing linkage to other larger habitat areas. This is especially true for forest carnivores, such as the Canada lynx.

CANADA LYNX (Threatened) – Affected Environment

The Canada lynx occurs across the boreal forests of Canada and Alaska in association with snowshoe hare habitat or habitat of other suitable prey species. They have also been found in isolated spruce, fir, and lodgepole pine forests of Washington, Idaho, Montana, Wyoming, and Colorado. Early successional stands with high densities of shrubs and seedlings are optimal for hares, and subsequently important for lynx. Mature forest stands are used for denning, cover for kittens, as well as travel corridors. Home ranges of lynx are generally 6 to 8 square miles, but range from 5 to 94 square miles. Males have larger ranges than females. Overlapping ranges do occur, mainly among animals of different sex and age classes. Adult lynx of the same sex tend to keep exclusive home ranges. Density of lynx in an area is highly dependent on prey (snowshoe hare) abundance. Most densities range from one lynx per 6 to 10 square miles.

In 1999-2001, lynx hair snares were established throughout Utah and other western states. No lynx hair samples occurred in northern Utah during this effort (Ogden Ranger District, wildlife files).

On July 3, 2003, the U.S. Fish and Wildlife Service issued a Notice of Remanded Determination of Status for the contiguous United States distinct population segment of the Canada Lynx (USDI 2003). The notice states that there is no evidence of lynx reproduction in Utah and that lynx, which occur in Utah, are dispersers rather than residents.

On November 9, 2005, the USFWS proposed critical habitat for the Canada Lynx within the United States; no critical habitat is proposed within the project area or within Utah (50 CFR Part 17, Volume 70, No. 216). Within the USFWS Recovery Outline for the Canada Lynx (USDI FWS 2005), core areas, provisional core areas, secondary areas, and peripheral areas were identified; none of these areas have been identified to occur within the project area.

On February 28, 2008, the U.S. Fish and Wildlife Service proposed to revise designated critical habitat, and under this proposal, no critical habitat is proposed in Utah or the Wasatch-Cache National forest. (Federal Register, Vol. 73, No. 40, p. 10860-10896).

Reports of lynx in Utah indicate sightings between 1961 and 1982 on the Ashley and Wasatch-Cache National Forests, but no sightings between 1983 and 1993 (USDA Forest Service 1994). In August/September 2004, a transplanted lynx released in southwestern Colorado traveled on to the

Wasatch-Cache National Forest and moved northward through both the Ogden and Logan Ranger Districts into Idaho.

In Utah, Engelmann spruce, white fir, subalpine fir, and lodgepole pine forests at the higher elevations, 7,300 to 10,500 feet (2,250 to 3,250 meters) are the primary vegetation cover types that may contribute to lynx habitat. Quaking aspen dominates much of the landscape, but snowshoe hares may use aspen stands much less than conifer stands in this area (Wolfe et al. 1982), probably because they lack dense overstory cover (Hodges 2000). Where they are intermixed with spruce/fir and lodgepole pine stands, aspen stands would constitute secondary vegetation that may contribute to lynx habitat (Ruediger et al. 2002).

Habitat for Canada lynx occurs within the Ogden Ranger District, primarily in the conifer cover types dominated by various combinations of lodgepole pine, Douglas-fir, subalpine fir, and Engelmann spruce interspersed with the aspen cover type. The Ogden Ranger District lies within a "travel corridor" between two larger habitats areas (in Idaho and within the Uinta Mountains of Utah) and is not considered permanent resident habitat. In a letter from the USFWS dated November 6, 2002, lynx habitat within the Ogden Ranger District was reclassified from Lynx Analysis Unit (LAU) to linkage area due to a low percentage of primary habitat.

Maintaining connectivity with Canada and between mountain ranges is an important consideration for the Northern Rocky Mountains Geographic Area (Ruediger et al. 2002). It is likely that the Northern Rocky Mountains Geographic Area and the Southern Rocky Mountains Geographic Area of Colorado and southern Wyoming are poorly connected. Shrub-steppe communities in central and southern Idaho, Wyoming, southeast Montana, and eastern Oregon may provide connectivity between adjacent mountain ranges. Along the Continental Divide, they may also provide an important north-south link between large patches of lynx habitat. Appendix A – Map 8 displays lynx primary and secondary habitat within the Ogden Ranger District. Based on the location of primary and secondary habitat and the connectivity of habitat, the most direct connection passes through the eastern portion of the Ogden Ranger District (eastern portion of the district); thus connecting to the Logan Ranger District to the north and the Uinta Mountains to the southeast.

Table 3.12.20 displays the percentage and number of acres of primary and secondary habitat that occurs on the Ogden Ranger District (only USFS managed lands). Primary habitat within the Ogden Ranger District consists of 5.6% of the Wasatch-Cache National Forest. Secondary habitat within the Ogden Ranger District consists of 15.9% of the Wasatch-Cache National Forest. Table 3.12.21 displays the percentage and number of acres of primary and secondary habitat within the Big Creek Analysis Area.

Table 3.12.20. Acres and percent of lynx habitat on the Ogden Ranger District (only USFS managed lands).

Location	Total Acres	Primary Habitat	Percentage	Secondary Habitat	Percentage
Ogden Ranger District	161,533	20,975	13	51,379	32

Table 3.12.21. Acres of lynx habitat within the Big Creek Analysis Area (only USFS managed lands).

Location	Project Area Acres*	Primary Habitat Acres*	Secondary Habitat Acres*
Big Creek Analysis Area	16,369	4,129	7,050

* Acre figures represent USFS lands only.

The July 3, 2003 U.S. Fish and Wildlife Service Notice of Remanded Determination of Status for the contiguous United States distinct population segment of the Canada Lynx (USDI 2003) specified the current threats from timber harvest and thinning on both non-federal and federal lands to lynx in the Northern Rockies/Cascade and Southern Rocky Mountains Regions are low.

The Lynx Conservation Strategy (Ruediger et al. 2000) specifies both programmatic (Forest Planning Level) and project planning standards and guidelines related to *"movement and dispersal."* The most applicable related to this project is the programmatic planning guideline:

> 1. Where feasible, maintain or enhance native plant communities and patterns, and habitat for potential lynx prey within identified key linkage areas.

The Lynx Conservation Strategy (Ruediger et al. 2000) does not specify any specific conservation measures to address "*movement and dispersal"* of lynx related to vegetation treatment (i.e., timber harvest, prescribed fire, or mechanical/herbicide treatments).

During dispersal, Murray et al. (1994) and Poole et al. (1996) have reported lynx movement through large areas of non-forest habitat. In addition, Squires and Laurion (2000) have specified that lynx can readily move across landscapes fragmented by commercial forestry. In relationship to effects to the wildlife corridor, the following is pertinent from the Notice (USDI 2003): "To significantly impact a local lynx population, an activity would have to occur across a very large area (presumably at least the size of several home ranges), create a homogeneous forest that does not provide the various stand ages, species composition, and structure that are good snowshoe hare and lynx habitat, or result in a barrier that effectively precludes dispersal."

CANADA LYNX – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Table 3.9.4 (Section 3.9, Forested (Vegetation)) displays by alternative the post treatment PFC distribution and the desired PFC condition. Alternatives 1 and 3 create age-class diversity within conifer and aspen vegetation types across the landscape, thus enhancing native plant communities and patterns, and habitat for potential lynx prey within a key linkage area (Lynx Conservation Strategy: programmatic planning guideline). Both action alternatives do this in varying degrees with Alternative 3 maintaining more old/mature forest, while Alternative 1 creates greater amounts of early seral vegetation conditions enhancing greater amounts of prey species habitat. See the snowshoe hare (prey species) section for details regarding vegetation treatment type effects. Alternative 1 would treat approximately 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 461 acres of conifer. Alternative 3 would treat approximately 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 355 acres of conifer. Alternative 1 would have slightly greater benefits to lynx prey habitat than Alternative 3. The vegetation treatments will have short-term negative effects directly after implementation, but overall will enhance and improve prey numbers and availability in the future.

In addition, these alternatives will construct additional temporary roads and open administrative use only routes within lynx habitat. All these actions will be temporary and would not be open to the public during or after project implementation. After implementation, open road density would return to the densities identified within Table 3.12.4 (see cumulative effects).

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not make improvements to habitat conditions that would benefit lynx prey species.

c. Cumulative Effects

For this project, the alternatives affect habitat and potentially affect movement through the corridor. For effects to habitat, see the snowshoe hare section. Activities such as prescribed/natural fire, timber harvest, and fire suppression may influence habitat conditions by changing the age structure of forested and shrub steppe habitats, thus influencing prey species, but these activities will not likely affect connectivity (i.e., be a barrier to movement).

The area of influence for the cumulative effects analysis is a portion of the wildlife corridor consisting of the Ogden Ranger District (USFS lands) and the directly adjacent lands of other ownership. In addition, the activities would be limited in time to those which occur during the summer since the effects of the temporary roads and harvest activities do not overlap in time with winter activities, thus the two types of effect would not be additive. The effect of temporary roads and timber harvest activities proposed within Alternatives 1 and 3 occur at higher elevations in which winter weather conditions precludes operations. Unlike the effects of several projects on a species habitat accumulating within a given area adding up to have a total cumulative effect; to affect connectivity, negative effects would have to accumulate in a pattern to prevent movement (e.g., in a linear pattern from east to west across the corridor). Activities in other portions of the corridor, not associated with the Ogden Ranger District may negatively effect movement within the corridor, but would not be additive as a cumulative impact to affect connectivity within the portion of the corridor associated with the Ogden Ranger District.

Concerning "*movement and dispersal",* the Lynx Conservation Strategy (Ruediger et al. 2000) identifies highways, private lands utilized for commercial or residential development, high human use patterns, ski area development, and livestock grazing as actions which may influence movement/dispersal of lynx.

The Big Creek Project will construct additional temporary roads and open administrative use only routes within lynx habitat. All these actions will be temporary and would not be open to the public during or after project implementation. After implementation, open road density would return to the densities identified within Table 3.12.4. Again, it is important to emphasize, "At this time, there is no compelling evidence to suggest management of road density is necessary to conserve lynx" (Ruediger et al. 2000). Since these actions are temporary and small in scope and forest roads have not been identified as a factor regarding lynx management, additional detailed cumulative effects is not expanded upon.

Additional details regarding lynx can be found within the cumulative effects analysis for the Ogden Travel Plan SEIS: Canada Lynx (USDA Forest Service 2007; SEIS, p. 4-33 through 4-36). Alternatives 1 and 3 may temporarily add to the "potential" cumulative effects. In combination with the past, present, ongoing, and future activities such as ski area development, urbanization/development and activities associated with adjacent lands (including highways), disturbance associated with roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5), and urbanization/development and activities associated with adjacent lands, these alternatives may "potentially" add to cumulative effects on connectivity (for additional details refer USDA Forest Service 2007; SEIS, cumulative effects analysis for the Canada Lynx). However, these effects may alter movement by lynx, but will not accumulate in a

pattern across the portion of the corridor associated with the Ogden Ranger District to prevent movement by lynx.

BLACK-FOOTED FERRETS (Endangered) – Affected Environment

Black-footed ferrets are a prairie species almost entirely obligate on prairie dog towns for food and shelter. Portions of Rich County are considered to be historic range for black-footed ferrets. The Wasatch-Cache National Forest is probably on the very edge of this range, if included at all. None are known to occur within the USFS portion of the Big Creek Watershed therefore there will be no impact to this species, and it will not be further analyzed.

FOREST SERVICE INTERMOUNTAIN REGION SENSITIVE SPECIES

Of those species listed as sensitive for the Wasatch-Cache NF, the following occur within the Big Creek Analysis Area: flammulated owl, northern goshawk, three-toed woodpecker, and the Townsend's big-eared bat. Currently, the pygmy rabbit is not known to occur on the district, but do occur in areas near the district boundary. The greater sage grouse is known only to occur within a small portion of the project area, and in areas adjacent to the district boundary. The wolverine, great gray owl, and boreal owl may possibly occur within the analysis area. The sharp-tailed grouse, bald eagle, and the spotted bat are not known to occur within the area. The peregrine falcon was recently identified as a Forest Service sensitive species after the U.S. Fish and Wildlife Service removed it from endangered status. Detailed habitat requirements and general distribution information for all sensitive species on the Wasatch-Cache National Forest are discussed in the Revised Forest Plan (USDA Forest Service 2003). The bald eagle has been recently reclassified as a Forest Service sensitive species after the U.S. Fish and Wildlife Service removed it from threatened status.

NORTHERN GOSHAWK

Northern goshawk is also Management Indicator Species for the Forest and is described in detail in that section.

BALD EAGLES

Bald eagles are winter visitors for the most part to Utah and tend to congregate wherever food is available, often near open water where fish and waterfowl can be caught. No open water occurs within the USFS portion of the Big Creek Watershed. Therefore, this species will not be further analyzed.

PEREGRINE FALCONS

Peregrine falcons were recently identified as a Forest Service sensitive species after the U.S. Fish and Wildlife Service removed it from endangered status. There are no known nest sites or cliff habitat within the Big Creek analysis area. Therefore, this species will not be further analyzed.

GREAT GRAY OWLS

Great gray owls use mixed coniferous and hardwood forests usually bordering small openings or meadows. They forage along edges of clearings. Semi-open areas, where small rodents are abundant, near dense coniferous forests, for roosting and nesting, are optimum habitat for great gray owls. During winter some birds stay on or near their breeding territories and others make irregular movements in search of prey and favorable snow conditions. In the Intermountain Region, great gray owls occur primarily in

lodgepole pine/Douglas-fir/aspen zone and in ponderosa pine. Great gray owl surveys have been conducted on the Ogden Ranger District. Data collected from these surveys yielded no evidence of great gray owls (Ogden Ranger District, wildlife files). In general, it is felt that these winter vagrants only occasionally visit Utah. Since great gray owls seem to only occur within Utah in the winter and the proposed management activities would be limited to the summer, there would be no effect to the great gray owl. Therefore, this species will not be further analyzed.

BOREAL OWLS – Affected Environment

Boreal owls have a range that is circumboreal. In North America, it breeds from Alaska east across Canada, and south into the mountains of Washington, Idaho, Montana, Wyoming, and Colorado. Boreal owls are closely associated with high elevation spruce/fir forests because of their dependence on this forest type for foraging year round. Nesting habitat structure consists of forests with a relatively high density of large trees (12 inch dbh), open understory, and multi-layered canopy. Owls nest in cavities excavated by large woodpeckers in mixed conifer, aspen, Douglas-fir, and spruce/fir stands. In winter, they may move down in elevation and roost in protected forested areas. Boreal owls avoid open areas, such as clearcuts and open meadows, except for occasional use of the edges of openings for foraging.

Boreal owls have responded to taped calls in northern Utah in two to three locations on the Ashley, Uinta, and Wasatch-Cache National Forests. The Wasatch-Cache NF observation/responses have been concentrated along the Rich and Cache County line on the Logan Ranger District. Nest locations have not been found. In 2001, on the Uinta National Forest, a nesting boreal owl was located; this being the first documented nesting of a boreal owl in Utah (Mika 2000 pers. comm.). During the winter/spring of 2001/2002 and 2006 broadcast calling surveys were conducted within the Ogden Ranger District. No responses were heard during these surveys (field data available in the project file). The boreal owl is not known to occur on the Ogden Ranger District, but may possibly occur on the district in the areas that contain large stands of conifer habitat.

BOREAL OWLS – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

The proposed treatment types that remove most of the overstory trees are Clearcut, Conifer Removal w/patch, Conifer Removal w/fire, Prescribed Fire (forested portion of mosaic and shrub treatments), and Overstory Removal/Clearcut. Overstory Removal/ Clearcut occurs in stands or portion of stands that have had prior harvest. Since patch cuts resemble small clearcuts (removal of the overstory is 1 acre or greater in size) these treatment types are categorized as clearcut. Treatment types that remove only a portion of the canopy cover are considered as partial harvest. These are IRSW preparation cut, Shelterwood preparation cut, and Group selection. Table 3.12.1A displays the acres of treatment by type for each of the alternatives. Alternative 1 would treat approximately 1,011 acres, which would remove most of the overstory trees, while Alternative 3 would treat approximately 707 acres. Alternative 1 and 3 would partial harvest approximately 158 within 542 acres and approximately 115 acres and 403 acres respectively. Partial harvest would retain a portion of the mature forest canopy thus retaining some of the characteristics for owl nesting habitat.

Table 3.9.4 (Section 3.9, Vegetation (Forested)) displays by alternative the post treatment PFC distribution and the desired PFC condition. Alternatives 1 and 3 create age-class diversity within conifer and aspen vegetation types across the landscape. Alternative 1 would treat 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat 461 acres of

conifer. Alternative 3 would treat 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat 355 acres of conifer. Alternative 1 which treats a larger amount of mature forest, would have a greater affect to possible boreal owl habitat than Alternative 3. Though mature and old forest will be treated by these two alternatives affecting possible boreal owl habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions.

Loss of snags can have affects on cavity nesting species. All proposed timber harvest units will retain the required number of snags and amount woody debris as outlined by Revised Forest Plan Guideline G16 (USDA Forest Service 2003, p. 4-42).

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not affect habitat for the boreal owl.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for the boreal owl would be mature and old forested habitat within the Big Creek area (USFS lands) and adjacent forested habitat of other ownership. The primary activities that would add to a cumulative effect would be related to the modification of mature and old forested habitat such as timber harvest and fire (other activities would likley be minor and insignificant cumulative effects for the boreal owl). Loss of snags associated with greater access for firewood harvest can have affects on cavity nesting species; currently, the Ogden Ranger District does not have a firewood harvest program.

Timber Harvest
Table 3.9.2 within Section 3.9 Vegetation (Forested) displays the current acres of structural stages of forested habitat within the Big Creek area. This table thus reflects past timber harvest. Also see Table 3.9.8 which displays the past timber sales which have occurred within the project area. The majority of harvest has been clearcutting of lodgepole pine or individual/group selection within fir types. A large proportion of the landscape is in the mature class. Past timber harvest has likely reduced boreal owl habitat. Thus, past harvest has added to the cumulative impacts within boreal owl habitat.

Prescribed fire and natural fire have been limited in extent within the project area. *Fire Suppression* within boreal owl habitat has likely had beneficial effects. Fire suppression has reduced the loss of mature stands, though adding to the possibility of future greater catastrophic effects.

Development and Activities Associated with Adjacent Lands
The effects to boreal habitat associated with the Big Creek project would be limited to "forested" habitat directly adjacent to USFS lands; primarily timber harvest. The effects are similar to those described above. Timber harvest on adjacent lands has likely added to the cumulative impacts.

As discussed above, Table 3.9.4 displays the PFC distribution for the project area, thus displaying past, present, and proposed activities which would affect mature and old forest. Though mature and old forest will be treated by the two action alternatives affecting boreal owl habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions.

WOLVERINE – Affected Environment

Recent data searches (USDA Forest Service 1994) indicate that no wolverines were sighted in Utah between 1961 and 1983, but there were sightings between 1983 and 1993, on the Ashley and Wasatch-Cache National Forests. A 1995 survey conducted in Franklin Basin did not produce any tracks or photographic evidence of wolverines (Bissonette et al. 1995). On March 29, 2002 a helicopter survey for wolverine conducted by the Caribou National Forest identified probable wolverine tracks just south of the Idaho/Utah state line (USDA Forest Service 2002). On March 17, 2004 a vehicle hit and killed a wolverine on U.S. Highway 30 near Fossil Butte National Monument west of Kemmerer. There have been unconfirmed sightings elsewhere on the Wasatch-Cache National Forest.

Rowland et al. (2003) displayed that greater amount of habitat, low road density, and low human population density corresponded closely with observations of wolverines. Carroll et al. (2001) predicted the occurrences of wolverine declined when road densities exceed 1.7 km/ km^2 (2.74 miles/$mile^2$). Modeling by Rowland et al. (2003) suggested a lower threshold in that differences in occurrences were distinguishable between moderate (0.44 to 1.06 km/km^2 or 0.71 miles/$mile^2$ to 1.71 miles/$mile^2$) and low road densities.

Table 3.12.4 displays the miles of open road and motorized trail per square mile within sixth order watersheds within USFS managed lands for the Big Creek area.

On March 11, 2008, the U.S. Fish and Wildlife Service issued a 12-month finding that the population of wolverine occurring in the contiguous United States is not warranted for listing as an endangered or threatened species under the Endangered Species Act. (Federal Register, Vol. 73, No. 48, p. 12929-12941).

WOLVERINE – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

The October 21, 2003 U.S. Fish and Wildlife Service, 90-day Finding for a Petition to List as Endangered or Threatened Wolverine in the Contiguous United States (USDI 2003) specified that "Hornocker and Hash (1981) found no difference in wolverine densities between wilderness and non-wilderness areas of their study, nor were there differences in their movement, habitat use, or behavior. The non-wilderness portion was mainly used by humans for logging and recreation. Copeland (1996) also found wolverines in areas that were currently being logged." Prescribed fire and timber harvest will change the age structure of forested habitats, thus influencing prey species (see deer, elk, and snowshoe hare). Creation of age-class and structural diversity within wolverine habitat would be beneficial to both the wolverine and prey species.

Both Alternative 1 and 3 would create new temporary roads and open portions of administrative use only roads to access harvest units, which would temporarily increase road density. These roads will not be considered for public use during or after harvest activities. As part of this project, "open" road density will not change by alternative. The effects of this disturbance would be temporary in duration and would temporarily displace species such as elk. Disturbance would occur in specific areas and not across the entire Big Creek area, since the harvest activities would likely be divided into separate sales occurring at different times. In comparison of the alternatives, Alternative 1 would have a larger effect creating more new routes and utilizing a greater number of existing administrative use only routes than Alternative 3. Alternative 3 with less road construction/use would have slightly less disturbance effects than Alternative

1. Alternative 2 is the No Action Alternative, thus no temporary changes in road density. The effects to the wolverine would be related to the effects on their prey species such as snowshoe hare, deer, moose, and elk (see those respective sections). None of the alternatives would exceed 2.74 miles of open road and motorized trail per square mile within the Upper Big Creek or Little Creek watersheds. The harvest activities and the temporary roads may have short-term disturbance effects.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus there are no proposed changes in vegetation age-class or structural diversity, nor changes in road density. This alternative would not affect the wolverine. This alternative would not make improvements to habitat conditions that would benefit wolverine and its prey species.

c. Cumulative Effects

For this analysis, the area of influence for the cumulative effects analysis is wolverine summer habitat consisting primarily of forested habitat within the Big Creek area (USFS lands) and the directly adjacent lands of other ownership. Many past, present, ongoing, and future activities make changes in vegetation successional stages, most are beneficial to wolverine prey species (see deer, elk, and snowshoe hare sections for additional details). These activities primarily affect habitat conditions and are not associated with changes in road density. Past, present, ongoing, and future activities such as livestock grazing, fire suppression, disturbance associated with roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5), and urbanization/ development and activities associated with adjacent lands would add to cumulative impacts (for additional details refer USDA Forest Service 2007; SEIS, cumulative effects analysis for the Wolverine Summer Habitat {Big Creek Area Only}, SEIS, P. 4-39 and 4-40). Adjacent lands of other ownership are primarily categorized as low for human influence and majority of these adjacent lands are not forested habitat (shrublands). Even though these activities may add to the cumulative impacts, Alternative 2 has no change to the existing condition, while Alternatives 1 and 3 create age-class and structural diversity within wolverine habitat which would be beneficial to both the wolverine and prey species. The harvest activities and the temporary roads may have short-term disturbance effects. Though a small and minor effect, this reasonable foreseeable future action may temporarily add to the cumulative impacts within wolverine habitat.

TOWNSEND'S BIG-EARED BATS – Affected Environment

Townsend's big-eared bats are widely distributed throughout the Intermountain Region. The species have been identified in Bat Cave on the Ogden Ranger District and in Logan Cave on the Logan Ranger District. They may exist in other areas of the Forest where there is suitable cave or cliff roosting habitat. In the west, big-eared bats use juniper/pine forests, shrub/steppe grasslands, deciduous forests, and mixed coniferous forests from sea level to 10,000 feet. During winter they roost singly or in small clusters in caves, or rocky outcroppings, occasionally in old buildings, or mine shafts.

Bat Cave, near Causey Reservoir was visited during 1992 and 1993, with Townsend's big-eared bat numbers varying from 5 to 245 individuals (Lengus 1994). No caves are known to occur within the Big Creek area.

TOWNSEND'S BIG-EARED BATS – Environmental Consequences

None of the alternatives would affect known Townsend's Big-eared bat roosting sites, maternity colonies,

or hibernacula. Most bat species tend to utilize riparian habitats due to the presence water and abundance of insects. The effects to foraging habitat for bat species, within riparian habitat areas, would be minor and not be significant. The vegetation treatment (primarily prescribed fire) may have short-term negative effects influencing insect abundance directly after implementation. These effects would be short-lived and would probably be beneficial in the long term to bat foraging habitat.

Since there will be no effect to hibernacula and maternity colonies, riparian areas and water sources are buffered to reduce effects, and vegetation treatments will likely be beneficial to foraging bats, the actions of these alternatives in combination with other past, present, or reasnably forseable activities would not add to the cumulative impacts to big-eared bat habitat.

FLAMMULATED OWLS – Affected Environment

Flammulated owls breed from southern British Columbia south to Veracruz, Mexico and from the Rocky Mountains to the Pacific. Their winter range is thought to extend from central Mexico to Guatemala and El Salvador. Flammulated owls are a migratory species that occur in mixed conifer forest with spruce and fir at higher elevations and have also been found in aspen communities. They prefer ponderosa pine/Douglas-fir forests with open canopies. Large diameter (greater than 20 inch dbh) dead trees with cavities at least as large as northern flicker cavities are important site characteristics. Territory size varies from 20 to 59 acres and is determined by age and patchiness of overstory trees.

Flammulated owls are present on the Wasatch-Cache National Forest and appear to be fairly well distributed. On the Ogden Ranger District, flammulated owl habitat primarily consists of mature stands of aspen, aspen/conifer, and conifer/aspen. Flammulated owl studies have occurred on the Ogden Ranger District in which they have focused on the effects of disturbance and feeding habits (Mika 2003).

Across the Wasatch-Cache NF and the intermountain west, aspen has become a smaller component of the forested landscape. One of the reasons for this reduction in aspen has been the conversion of aspen stands to conifer stands through succession. In order to maintain aspen in the landscape, fire and mechanical treatments need to occur to restore many of these aspen clones.

FLAMMULATED OWLS – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

The effects to the flammulated owl are similar to those of the boreal owl; see the boreal owl section for effects discussion.

Treatments within aspen habitat will improve vegetation conditions in the long term for the flammulated owl by providing a mix of aspen age-classes across the landscape, thus having beneficial effects and overall enhancing future habitat conditions. The prescribed fire treatments will have a mosaic effect (various burn intensities) that will likely create new snags for nest cavities for the flammulated owl. Treatments will negatively affect flammulated owl habitat, but treatments will maintain a mix of age classes and maintain aspen across the landscape, thus likely benefiting the flammulated owl in the long run.

Flammulated owl breeding activity was found to be high in relationship to prescribed fire Unit 59. For the southern portion of this unit, which is forested, prescribed fire activities/impacts will be minimized to maintain nesting habitat.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not affect habitat for the flammulated owl. The aspen vegetation type would continue to decline in acreage with the conversion to conifer vegetation types.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for flammulated owl is forested habitat (primarily aspen) within the Big Creek Project Area (USFS lands) and within the associated inholdings and directly adjacent forested lands of other ownership.

The past, present, or ongoing activities which may have an influence within flammulated owl habitat includes livestock grazing, timber harvest, prescribed fire, natural fire, fire suppression, roads/trails, and development and activities associated with adjacent lands. Other activities would likely have very small or very limited effects to flammulated owl habitat (e.g., riparian fences, gravel pits, road maintenance, and dispersed recreation use/camping). The primary effects would be related to the modification of mature and old forested habitat such as timber harvest and fire.

Livestock/grazing management can have an effect on flammulated owl habitat by reducing prey habitat (forage and cover). The flammulated owl feeds almost exclusively on insects, primarily moths. Habitats vary in the capability to support prey and it is unknown whether this influences owl distribution (Hayward and Verner 1994). An assumption has been made that greater foliage volume supports more insects. Livestock grazing and trampling reduces vegetation cover which likely decreases the abundance of nocturnal insect species utilized by flammulated owls. Livestock grazing would likely add to the cumulative impacts within flammulated owl habitat.

Timber Harvest
Table 3.9.2 within Section 3.9 Vegetation (Forested) displays the current acres of structural stages of forested habitat within the Big Creek area. This table thus reflects past timber harvest. Also see Table 3.9.8 which displays the past timber sales which have occurred within the project area. The majority of harvest has been clearcutting of lodgepole pine or individual/group selection within fir types. A large proportion of the landscape is in the mature class. Past timber harvest has likely reduced flammulated owl habitat. Thus, past harvest has added to the cumulative impacts within flammulated owl habitat in the short term.

Prescribed fire and natural fire have been limited in extent within the project area. Fire within aspen and aspen/conifer stands has regenerated aspen and has created young aspen stands within the landscape. Regenerating aspen stands will be beneficial in the future as flammulated owl habitat. *Fire Suppression* within flammulated owl habitat has had both negative and beneficial effects. Fire suppression has affected owl habitat by reducing the abundance of early successional aspen age-classes and allowing a reduction of aspen within the landscape. Suppression has reduced the loss of mature aspen stands which provide nesting habitat for flammulated owls. The effects of fire suppression would likely add to the cumulative impacts within flammulated owl habitat in the short term.

Roads and Motorized Trails
Roads and motorized trails were addressed within Ogden Travel Plan. The disturbance affects will not likely eliminate use by flammulated owls, but may reduce reproductive success in areas adjacent to roads

and trails. The Big Creek Project creates additional temporary roads construction and opens administrative use only routes within flammulated owl habitat. Any new route would be temporary and would not be open to the public during or after project implementation, thus limiting disturbance to activities associated with construction and harvest. The harvest activities and the temporary roads may have short-term effects, thus the disturbance associated with the roads for the Big Creek project would be very limited. Existing roads and motorized trails may add to the cumulative effects within flammulated owl habitat.

Development and Activities Associated with Adjacent Lands
The effects to flammulated owl habitat associated with the Big Creek project area would be limited to "forested" habitat directly adjacent to USFS lands; thus primarily limiting activities to livestock grazing, timber harvest, and a variety of motorized and non-motorized recreational activities. Overall, the activities occurring within adjacent lands are likely a minor influence on flammulated owl habitat associated with the Big Creek area. The effects of these activities are similar to those described above; the activity likely causing the most effect to flammulated owls within adjacent lands would be timber harvest. This activity has likely added to the cumulative impacts.

Across the Wasatch-Cache NF and the intermountain west, aspen has become a smaller component of the forested landscape. One of the reasons for this reduction in aspen has been the conversion of aspen stands to conifer stands through succession. In order to maintain aspen in the landscape, fire and mechanical treatments need to occur to restore many of these aspen clones. Prescribed burning in mature aspen, aspen/conifer, and conifer/aspen stands will negatively affect areas used by the flammulated owl. Treatments will improve vegetation conditions in the long term for the flammulated owl by providing a mix of aspen age-classes across the landscape, thus having beneficial effects and overall enhancing future habitat conditions. In addition, the prescribed fire treatments will have a mosaic effect (various burn intensities) which will likely create new snags for nest cavities for the flammulated owl. Prescribed fire will negatively affect flammulated owl habitat, but treatments will maintain a mix of age classes across the landscape, thus likely benefiting the flammulated owl in the long run.

THREE-TOED WOODPECKERS – Affected Environment

Three-toed woodpeckers circumboreal distribution coincides with the range of spruce habitat, however they can be found in subalpine fir, Douglas-fir, grand fir, ponderosa pine, aspen, and lodgepole pine forests. The three-toed woodpecker is dependant on recent burns and bark beetle infestations for food resources. Coniferous forests generally above 8,000 feet (2,400 meters) in elevation are typical of wintering and nesting habitat. In Utah, three-toed woodpeckers also use aspen for nesting where intermixed or adjacent to coniferous forests (Hill et al. 2001). Territory occupancy is year-round however outbreaks or beetle infestations may cause irregular movements. The loss of snags associated with vegetation treatment can have effects on cavity nesting species.

THREE-TOED WOODPECKERS – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

The proposed treatment types that remove most of the overstory trees are Clearcut, Conifer Removal w/patch, Conifer Removal w/fire, Prescribed Fire (forested portion of mosaic and shrub treatments), and Overstory Removal/Clearcut. Overstory Removal/ Clearcut occurs in stands or portion of stands that have had prior harvest. Since patch cuts resemble small clearcuts (removal of the overstory is 1 acre or greater

in size) these treatment types are categorized as clearcut. Treatment types that remove only a portion of the canopy cover are considered as partial harvest. These are IRSW preparation cut, Shelterwood preparation cut, and Group selection. Table 3.12.1A displays the acres of treatment by type for each of the alternatives. Alternative 1 would treat approximately 1,011 acres, which would remove most of the overstory trees, while Alternative 3 would treat approximately 707 acres. Alternative 1 and 3 would partial harvest approximately 158 within 542 acres and 115 acres and 403 acres respectively. Partial harvest would retain a portion of the mature forest canopy thus retaining some of the characteristics for three-toed woodpecker habitat.

Table 3.9.4 (Section 3.9, Vegetation (Forested)) displays by alternative the post treatment PFC distribution and the desired PFC condition. Alternatives 1 and 3 create age-class diversity within conifer and aspen vegetation types across the landscape. Alternative 1 would treat approximately 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 461 acres of conifer. Alternative 3 would treat approximately 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat approximately 355 acres of conifer. Alternative 1 which treats a larger amount of mature forest, would have a greater affect to possible three-toed woodpecker habitat than Alternative 3. Though mature and old forest will be treated by these two alternatives affecting possible habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions. In addition, Schieck and Hobson (2000) found that three-toed woodpeckers were strongly associated with recently burned forests (2 years post burn) with abundant large snags and had lower densities in old forest. Alternative 1 would treat approximately 707 acres with fire (conifer removal followed by fire; prescribed fire mosaic; and prescribed fire (forested portion within shrublands) while Alternative 3 would treat approximately 510 acres. Treatment of mature forest habitat with fire will likely improve three-toed woodpecker habitat in the short-term.

All proposed timber harvest units will retain the required number of snags and amount woody debris as outlined by Revised Forest Plan Guideline G16 (USDA Forest Service 2003, p. 4-42).

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not affect existing habitat for the three-toed woodpecker.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for the three-toed woodpecker would be mature and old forested habitat within the Big Creek area (USFS lands) and adjacent forested habitat of other ownership. The primary activities that would add to a cumulative effect would be related to the modification of mature and old forested habitat such as timber harvest and fire (other activities would likely be minor and insignificant cumulative effects for the three-toed woodpecker). Loss of snags associated with greater access for firewood harvest can have affects on cavity nesting species; currently, the Ogden Ranger District does not have a firewood harvest program.

Timber Harvest
Table 3.9.2 within Section 3.9 Vegetation (Forested) displays the current acres of structural stages of forested habitat within the Big Creek area. This table thus reflects past timber harvest. Also see Table 3.9.8 which displays the past timber sales which have occurred within the project area. The majority of harvest has been clearcutting of lodgepole pine or individual/group selection within fir types. A large

proportion of the landscape is in the mature class. Past timber harvest has likely reduced three-toed woodpecker habitat. Thus, past harvest has added to the cumulative impacts within three-toed woodpecker habitat.

Prescribed fire and natural fire have been limited in extent within the project area. Past burns have likely been beneficial for a short period directly after the burn. *Fire Suppression* within three-toed woodpecker habitat has likely had beneficial effects. Fire suppression has reduced the loss of mature stands.

Development and Activities Associated with Adjacent Lands
The effects to three-toed woodpecker habitat associated with the Big Creek project would be limited to "forested" habitat directly adjacent to USFS lands; primarily timber harvest. The effects are similar to those described above. Timber harvest on adjacent lands has likely added to the cumulative impacts.

As discussed above, Table 3.9.4 displays the PFC distribution for the project area, thus displaying past, present, and proposed activities which would affect mature and old forest. Though mature and old forest will be treated by the two action alternatives affecting three-toed woodpecker habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions.

GREATER SAGE GROUSE – Affected Environment

Greater sage grouse were added to the Intermountain Region Sensitive Species list on November 17, 2003. Recent research has documented population declines of this species and identified concerns over the amount and quality of its habitats. The largest of the North American grouse, these birds inhabit sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. Where there is no sagebrush, there are no sage grouse.

Males gather on traditional "strutting grounds" (leks) during March and April and put on a spectacular courtship performance - strutting with tails erect and spread, and air sacs inflated. Females visit the grounds during the first part of April. A few dominant males do most of the mating. Nesting begins in April. Nests are shallow depressions lined with grass or twigs and are usually located under sagebrush. The female lays from five to nine eggs, which hatch after 25 days of incubation.

Surveys for the sage grouse have been conducted by UDWR for several years, primarily centered on locating leks and conducting population counts at lek sites (UDWR 2002). The primary sage grouse habitat and active leks sites associated with the Ogden Ranger District are outside of and east of the district or associated in the area of Hardware Ranch. No active lek sites are known to occur on the Ogden Ranger District. Guidelines or recommendations for the management of Sage Grouse Populations and their habitats primarily focus on the alteration of vegetation or habitat. For sage grouse, Connelly et al. (2000) recommended that "vegetation treatment not occur within 3.2 km (2 miles) from lek. The nearest lek site from the project area is greater than 5 miles away. Maps displaying the location of sage grouse habitat and lek sites (UDWR Habitat Map Information) are located within the project record. One hundred and eleven acres of sage grouse habitat occurs within the Big Creek Analysis area.

GREATER SAGE GROUSE – Environmental Consequences

Neither of the action Alternatives 1 or 3 propose treatment within these areas, thus implementation of any of the alternatives will not affect the sage grouse.

PYGMY RABBITS – Affected Environment

Pygmy rabbits were also added to the Intermountain Region Sensitive Species list on November 17, 2003. Pygmy rabbits prefer habitats of dense, tall stands of sagebrush associated with deep soils. The pygmy rabbit is not known to occur on the Ogden Ranger District. The pygmy rabbit is known to occur at lower elevations in the tall sagebrush habitats to the east near Bear Lake (Janson 2002). Pygmy rabbits have not been found within the analysis area and are not likely to occur based on surveys in the area.

On June 23, 2003, Adam Kozlowski (UDWR Biologist) conducted surveys for pygmy rabbits near Birch Creek, approximately 1 to 2 miles north of highway 39 near the eastern boundary of the Ranger District. The survey results were negative, though suitable habitat appeared to be present, there were concerns regarding the elevation and isolation from known locations of pygmy rabbits (UDWR Survey Results 23 June 2003, Adam Kozlowski).

On July 7, 2005 a survey (Steve Blatt, USFS wildlife biologist personal observation/survey) for pygmy rabbits was conducted in the vicinity of Big Crawford Spring (approximately one mile north and south) along the eastern boundary of the Ranger District. Numerous mounds with tall sagebrush were investigated but no pygmy rabbits were found. Numerous animal burrows occurred at these sites, but most were occupied by ground squirrels.

On February 23, 2006, a survey (Pygmy rabbit survey, Big Creek project record) of the northeastern portion of the Ogden Ranger District was conducted for the presence or absence of pygmy rabbits. This survey was conducted to examine potential effects from proposed sagebrush treatments associated with the Big Creek Project. The survey was conducted via snowmobile and started at the forest boundary fence and the junction of the Valley Ridge North Road (route xxx1 USDA Forest Service 2007; SEIS) (northeast corner of section 21). Transects running north and south were completed within the area. Conditions were ideal for examining tracks since the last snowfall had occurred the prior day. Neither pygmy rabbits nor sign was observed during the survey. Snow depths likely preclude the use of the area by pygmy rabbits. Limited amounts of sagebrush occurred above the snow (mostly seedheads and small branches) except on some wind swept areas where mountain big sagebrush was not common.

According to Dennis Austin (UDWR wildlife biologist), pygmy rabbits do not occur within Strawberry Valley, an area of private land in the northeastern portion of the Ogden Ranger District with similar sagebrush habitats (personal communication, December 2003).

As discussed above the pygmy rabbit is not known to occur on the Ogden Ranger District, therefore, implementation of any of the alternatives will not affect the pygmy rabbit.

NEOTROPICAL MIGRATORY/SONG BIRDS

Nineteen U.S. Forest Service neotropical migratory bird survey point counts routes have been established within the Ogden Ranger District of which nine routes have survey information for more than one year. The New Canyon and Running Water routes occur within the analysis area. The results of these surveys are located within the planning record.

Priority migratory bird species that occur within the Wasatch-Cache National Forest identified in the Utah Bird Conservation Plan (Utah Partners in Flight 2002) and/or those identified by USFWS as birds of conservation concern have been identified as species at risk in the Revised Forest Plan (see USDA Forest Service 2003, Appendix B-2). The Species at Risk List was revised on February 23, 2004 (see planning record). Of those species, the Brewer's sparrow and the broad-tailed hummingbird are the only species that have occurred on the New Canyon and Running Water transects.

Hutto et al. 1993 reviewed 18 papers regarding the effects of silvicultural treatments on songbirds. They found that clearcut harvest has negative effects on many forest-dependent species (e.g., brown creeper, red-breasted nuthatch, and golden-crowned kinglet) and positive effects on many species that frequent open forests or open habitats (e.g., mountain bluebird, dark-eye junco, and Townsend's solitaire). Other treatments (e.g., conifer removal followed by fire, mosaic fire, prescribed fire) that remove most of the overstory forest canopy would have similar effects.

Hutto and Young 2000 studied the effects of partial-cut harvest on landbirds in the Rocky Mountains found that some species are negatively affected by relatively low-volume partial harvest (e.g., common raven, winter wren, and golden-crowned kinglet) while others were in greater abundance than in uncut forests (e.g., chipping sparrow, western tanager, and mountain chickadee).

Treatments (prescribed fire, herbicide, and mechanical) within sagebrush habitats will convert approximately 40% (within the areas proposed for treatment) of the mature and old stands of sagebrush and other shrubs (within the treatment areas) to an earlier successional stage with a greater abundance of forbs and grasses. Treatments will create a mosaic of age-classes and structure within the shrub steppe habitat. Treated areas would be beneficial to early successional shrubland species, such as the vesper sparrow.

Though older age-class forest and shrubland habitat will be treated by Alternatives 1 and 3 affecting species which prefer older age-class structure and habitat, each of these alternatives move toward properly functioning condition while maintaining a proportion of old and mature forest and shrubland (see Table 3.9.4). Age-class proportions for properly functioning condition would maintain conditions for species within historical levels.

To minimize effects to neotropical birds mechanical and herbicide vegetation treatment of shrublands will occur prior to May 1 or in late summer or fall to avoid affecting nests, eggs, and nestlings. Treatment of shrublands and forested stands with the use of prescribed fire, should occur prior to May 1 or in late summer or fall, but may occur later (no later than May 31) due to weather, snowpack, and other conditions to provide a window of opportunity to conduct burn activities. Road construction and timber harvest activities should be planned when possible to occur within the late summer, fall, or winter to minimize effects to neotropical birds.

BREWER'S SPARROW – Affected Environment

Occurs in shrub steppe habitats in the western U.S., particularly in the Great Basin area (UDWR 2000). Brewer's sparrows breed primarily in shrub steppe habitats in Utah and are considered to be shrub steppe obligates. In Utah, Brewer's sparrows are common to very common summer residents. The species winters in the southwest U.S. and into Mexico. It nests in the mid-upper canopy of dense sagebrush and are usually located in patches of sagebrush that are taller and denser, with more bare ground and less herbaceous cover, than the surrounding habitat. Clutch size is usually three to four eggs. Brewer's sparrows will renest in a few days if the initial clutch is lost. Brewer's sparrows are primarily insectivorous during the breeding season. Loss of sagebrush steppe habitat is considered the main threat to the species.

Parrish et al. (2002) identified habitat loss and fragmentation as a management issue concern relate to the Brewer's sparrow and developed several recommendations for management of Brewer's sparrow habitat. Many of the recommendations are not applicable to this project, since this project is to provide age-class diversity within shrub-steppe habitat not habitat conversion (e.g., to cropland) and is to mimic natural fire regimes. Parrish et al. (2002) promoted the use of prescribed burning to avoid catastrophic wildfire and

recommended using small-scale mechanical and herbicide methods to enhance Brewer's sparrow habitats.

BREWER'S SPARROW – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Alternative 1 would treat (herbicide, fire, or mechanical) approximately 1,005 acres within 2,646 acres of shrublands. Alternative 3 would treat approximately 993 acres within 2,615 acres of shrublands. In comparison among the alternatives, shrubland vegetation treatment amounts are essentially the same between action alternatives. Treatment would create age-class and structural diversity within the shrublands, thus making the habitat less susceptible to the effects of catastrophic wildfires. This alternative would reduce habitat conditions for nesting Brewer's sparrows in the short term, but would benefit the Brewer's sparrow in the long term by maintaining a more stable population and reducing the risk of catastrophic fire that could greatly reduce sparrow habitat. Though older age-class shrublands will be treated by these two alternatives affecting Brewer's sparrow habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature shrublands. The mitigation described below would minimize some of the effects of treatment and provide breeding habitat.

The following mitigating measures will be implemented to reduce the effect of sagebrush treatments on Brewer's Sparrows. These measures have been developed from available literature on habitat characteristics preferred by breeding and nesting Brewer's sparrows (see Parrish et al. 2002).

- Vegetation treatment should occur prior to May 1 or in late summer or fall to avoid affecting nests, eggs, and nestlings (see recommendations above for all neo-tropical birds).

- Patches of mountain big sagebrush larger than 1.2 acres in size (average territory size), distributed within the treatment areas, should be retained to provide Brewer's sparrow habitat. Retained areas should be selected to have taller and denser sagebrush and have greater amounts of bare ground or less herbaceous understory vegetation than surrounding habitat. The areas should also have a greater percent of live shrub growth and less rock covered ground. The average height of sagebrush of nest areas in Idaho was approximately 27 inches tall.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative does not propose the treatment of shrublands; thus no effect to Brewer's sparrows in the short term. The dense mountain big sagebrush areas of uniform age would be susceptible to catastrophic wildfires. A catastrophic fire would greatly reduce the amount of habitat available for breeding Brewer's sparrows.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for the Brewer's sparrow is sagebrush habitat within the Big Creek area (USFS lands) and directly adjacent sagebrush habitat of other ownership. Past, present, ongoing, and future activities such as roads and motorized trails (see USDA Forest Service 2007; SEIS, Alternative 5) and urbanization/development and activities associated with adjacent lands would add to cumulative impacts (for additional details refer to USDA Forest Service 2007; SEIS, cumulative

effects analysis for the Brewer's Sparrow {Big Creek Area Only}, SEIS, p. 4-43 and 4-44). Brewer's sparrow has likely benefited, from many activities such as fire suppression and livestock grazing and would not add to the cumulative impacts within shrubland habitat. Both of these activities have likely increased the susceptible to catastrophic wildfires. The action alternatives would add to the cumulative effects, but mitigation measures will be adopted to minimize impacts. In addition, Parrish et al. (2002) specifies that the Brewer's sparrow population in Utah appears to be stable and possibly increasing.

BROAD-TAILED HUMMINGBIRD – Affected Environment

The broad-tail is a common breeder in the eastern and central parts of the Great Basin. It winters primarily in Mexico. It nests primarily in riparian habitat though also occurring within aspen, ponderosa pine, Engelmann spruce, subalpine fir, and Douglas-fir dominant habitats. The broad-tailed hummingbird typically requires streamside areas adjacent to open patches of meadows or grasses with good quantities of wild flowers available throughout the breeding season. This hummingbird feeds on nectar of wildflowers.

Nests are from as low as 3 feet to as high as 30 feet above the ground and are often found overhanging a stream. Threats to this species would include loss of riparian habitat and lack of wildflowers.

BROAD-TAILED HUMMINGBIRD – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Timber harvest activities that create open patches and increase wildflowers are likely to be beneficial to broad-tailed hummingbirds, while fires will likely reduce the abundance of wildflowers initially and reduce nesting habitat, burns will promote wildflowers and will be beneficial to hummingbirds (Parish et al. 2002). Hutto et al. 1993 reviewed 18 papers regarding the effects of silvicultural treatments on songbirds and found that broad-tailed hummingbirds were more abundant in 10 to 20 year old clearcuts and partially cut forests than uncut forests.

As described within the aquatics section, stream channels and other water sources are buffered to reduce effects to the aquatic environment. These mitigation measures would also benefit hummingbird habitat. Table 3.9.4 displays acres of treatment by habitat type by alternative. In comparison among the alternatives, Alternative 1 would treat greater amounts of habitat than Alternative 3. Alternative 1 would have slightly greater benefits to the hummingbird than Alternative 3.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative does not propose the treatment of habitat; thus no effect.

c. Cumulative Effects

Since the action alternatives will primarily be beneficial to hummingbirds and riparian areas are buffered to reduce effects, these alternatives in combination with past, present, and reasonably foreseeable activities would not cause cumulative impacts within hummingbird habitat.

SPECIES AT RISK

Species at risk have been identified in the Revised Forest Plan as "federally listed endangered, threatened, candidate, and proposed and other species for which loss of viability, including reduction in distribution or abundance, is a concern within the plan area. Other species-at-risk may include sensitive species and state listed species."

As the Revised Forest Plan explains, legal mandates and regulations (i.e., Endangered Species Act) and policy (i.e., sensitive species management) will continue as separate processes for threatened, endangered, and sensitive (TES) species listed under species at risk. These require analysis for any project implemented under the Revised Forest Plan to ensure that negative effects are avoided and viability is provided for these species. MIS species are also considered in project specific analyses. Species with federal status (i.e., endangered, threatened, candidate, proposed, and USFS sensitive species) are addressed elsewhere in this document under their respective categories. Species not specifically addressed through implementation and monitoring for TES or MIS will be managed opportunistically. By managing within the range of historic variation and properly functioning conditions it is expected that these species will be sustained in the long term. For additional information see the Wasatch-Cache National Forest FEIS, Appendix B-2: Terrestrial Wildlife Diversity and Viability (USDA Forest Service 2003). The Species at Risk List was revised on February 23, 2004. The following species are species at risk which have not been discussed anywhere else within this document (e.g., TES species and neotropical migratory/song birds).

FRINGED MYOTIS – Affected Environment

The fringed myotis is a small bat that occurs in most of the western United States, as well as in much of Mexico and part of southwestern Canada (UDWR 2001). It is uncertain whether this species occurs within the Ogden Ranger District, since only specimens from southern and east-central Utah have been reported in the literature (Hasenyager 1980). The fringed myotis inhabits caves, mines, and buildings, most often in desert and woodland areas. The species commonly occurs in colonies of several hundred individuals. The fringed myotis has been found in Utah in a moderately wide range of habitats: lowland riparian, desert shrub, juniper/sagebrush, sagebrush/rabbitbrush, pinyon/juniper/sagebrush, pinyon/juniper, mountain meadow, ponderosa pine forest, and montane forest and woodland (Douglas-fir/aspen) (Oliver 2000). Females generally give birth to a single offspring during the summer. Beetles which are plucked from vegetation or the ground are the major prey item.

FRINGED MYOTIS – Environmental Consequences

For the fringed myotis the effects would be similar to those regarding the Townsend's Big-eared Bat, though the fringed myotis has not been found to occur on the Ogden Ranger District.

PINE MARTEN – Affected Environment

The marten is a furbearing mammal that is about two feet in length from head to tail and yellowish-brown in color. It occurs in much of Alaska and Canada, and its range extends into several areas of the contiguous United States (UDWR 2001). In Utah, the species has been found in many of the high remote mountainous areas of the state. Pine martens prefer forest habitat, where their dens can be found in logs, hollow trees, stumps, and rock crevices. The species mates during the summer, and females give birth to a litter of one to five young during the following spring; litters are often smaller when food is scarce. Martens are typically solitary animals that may cover great distances each day looking for food. The diet of the species consists primarily of small mammals, although birds, insects, and fruits are occasionally consumed.

Marten are highly vulnerable to the effects of trapping, which can be influenced by access. Marten trapping is not open within the Ogden Ranger District and currently is only open in the northeastern portion of Utah (2007-2008 UDWR Furbearer Proclamation), though unintentional accidental trapping could occur.

PINE MARTEN – Environmental Consequences

a. Effects Common to Alternatives 1 and 3

1. Direct and Indirect Effects

Fuller and Harrison (2005) reviewed studies involving the partial harvest of forested stands and found comparable use to uncut stands (e.g., 57% overstory removal: Campbell 1979). They also reviewed literature regarding clearcut harvest and found that marten generally avoided these areas but the stands may become suitable habitat as they mature (e.g., tree height 30 feet or more). Regenerating clearcuts (less than 45 years old) supported from 0 to 33% of population levels of nearby uncut forest. Studies also suggest that marten territories are not established within areas with greater than 25 to 40% early successional forest.

Martens require overstory canopy cover of greater than 30% and prefer 50 to 70% canopy cover (Thompson and Harestad 1994). Selective logging including shelterwood harvest will not reduce marten habitat if removals are kept below 30% of the stem basal area. Marten prefer old forests with a complex understory or forest with patches (gaps).

Table 3.12.1A displays the acres of treatment by type for each of the alternatives. Alternative 1 would treat 1,011 acres, which would remove most of the overstory trees, while Alternative 3 would treat 707 acres. Alternative 1 and 3 would partial harvest 158 within 542 acres and 115 acres and 403 acres respectively. Partial harvest would retain a portion of the mature forest canopy thus retaining some of the characteristics for marten habitat.

Table 3.9.4 (Section 3.9, Vegetation (Forested)) displays by alternative the post treatment PFC distribution and the desired PFC condition. Alternatives 1 and 3 create age-class diversity within conifer and aspen vegetation types across the landscape. Alternative 1 would treat 732 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat 461 acres of conifer stands. Alternative 3 would treat 489 acres of mature aspen, aspen/conifer, or conifer/aspen creating young seedling/sapling aspen stands and treat 355 acres of conifer stands.

Alternative 1 which treats a larger amount of mature forest, would have a greater affect to marten habitat than Alternative 3. Though mature and old forest will be treated by these two alternatives affecting marten habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions.

Marten are highly vulnerable to the effects of trapping, which can be greatly influenced by access provided by roads and trails. Associated with the action alternatives, additional road construction and/or opening of administrative use only routes would occur within marten habitat. Any new route would be temporary and would not be open to the public during or after project implementation. Marten trapping is not open within the Ogden Ranger District and currently is only open in the northeastern portion of Utah (2006- 2007 UDWR Furbearer Proclamation). Thus, any changes in accessibility will not likely influence marten populations.

b. Alternative 2 – No Action

1. Direct and Indirect Effects

This alternative is the existing condition, thus no proposed change in vegetation age-class or structural diversity. This alternative would not affect habitat for the marten.

c. Cumulative Effects

The area of influence for the cumulative effects analysis for the marten would be mature and old forested habitat within the Big Creek area (USFS lands) and adjacent forested habitat of other ownership. The primary activities that would add to a cumulative effect would be related to the modification of mature and old forested habitat such as timber harvest and fire (other activities would likley be minor and insignificant cumulative effects for the marten).

Timber Harvest
Table 3.9.2 within Section 3.9 Vegetation (Forested) displays the current acres of structural stages of forested habitat within the Big Creek area. This table thus reflects past timber harvest. Also see Table 3.9.8 which displays the past timber sales which have occurred within the project area. The majority of harvest has been clearcutting of lodgepole pine or individual/group selection within fir types. A large proportion of the landscape is in the mature class. Past timber harvest has likely reduced marten habitat. Thus, past harvest has added to the cumulative impacts within marten habitat.

Prescribed fire and natural fire have been limited in extent within the project area. *Fire Suppression* within marten habitat has likely had beneficial effects. Fire suppression has reduced the loss of mature stands, though adding to the possibility of future greater catastrophic effects.

Development and Activities Associated with Adjacent Lands
The effects to marten habitat associated with the Big Creek project would be limited to "forested" habitat directly adjacent to USFS lands; primarily timber harvest. The effects are similar to those described above. Timber harvest on adjacent lands has likely added to the cumulative impacts.

As discussed above, Table 3.9.4 displays the PFC distribution for the project area, thus displaying past, present, and proposed activities which would affect mature and old forest. Though mature and old forest will be treated by the two action alternatives affecting marten habitat, each of these alternatives move the forest toward properly functioning condition while maintaining a proportion of old and mature forest conditions.