Chapter 3 Affected Environment and Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected analysis area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives.

Only resources the IDT determined to be affected are identified and analyzed. The level of detail is commensurate with the amount of information necessary to understand the effects of the actions. The effects discussions presented in this chapter are summaries of information from the IDT resource specialists and their field work, meeting participation and input into the document. The summaries focus on the resource issues and project goals disclosed in Chapter 1.

Analysis Area and Timeframe. In general, the period over which effects are projected for the analysis is 10 to 20 years. The analysis area is encompassed within 15 sixth-level hydrologic unit boundaries (HUB) or watersheds, (*see* Sections 1.2 and 3.3).

3.1 Vegetation

The Forest Plan (III-19-21, 207) includes management direction for providing vegetative diversity. Forest Plan direction includes the following:

- Improve tree age class and species diversity to benefit forest health, recreation experiences, visual quality, and wildlife habitat (III-8).
- Maintain or establish a minimum of 20% of the forested area in a unit in vertical diversity.
- Maintain or establish a minimum of 30% of the forested area in a unit in horizontal diversity.
- In forested areas of the unit maintain at least 5% in grass/forb stage.
- In forested areas of the unit, maintain at least 10% as old growth.
- Retain six to 10 snags per 10 acres, well distributed throughout the diversity unit.
- Retain dead-down logs where biologically feasible (10 inches in diameter and 33 linear feet/acre in aspen and lodge pole pine, 12 inches in diameter and 50 linear feet/acre in Douglas-fir and spruce/fir). Because the areas of treatment are mixed species stands, the standard for this project would be 12 inches in diameter and 50 linear feet/acre of dead/down.
- Aspen type is to be retained wherever it occurs.
- Riparian areas are treated to improve wildlife habitat through silvicultural objectives.

3.1.1 Diversity

Vegetative diversity is a factor of not only the variety, but also the abundance and distribution of different plant communities. Diversity of vegetation is important as an indicator of forest health, which relates to a variety of habitats for vertebrate and invertebrate animal communities, visual diversity for the forest visitor, and resistance to, and resilience in response to rapid, large scale changes over the landscape. Any management influence relative to controlling vegetative diversity and it's related factors such as wildlife species diversity, habitat, forest health, and susceptibility to disturbance factors in largely a matter of understanding and controlling vegetative succession at a landscape scale. Control of succession for management purposes is accomplished by purposeful design and manipulation of vegetation patches to achieve desired composition, structure, and patterns over a landscape.

Forest Plan standards relating to diversity were formulated to ensure that sufficient amounts of each natural occurring vegetation type and seral stage are available over a landscape area to maintain habitat for viable populations of all desired wildlife species while simultaneously allowing for maintenance or enhancement of habitat for management indicator species (MIS).

Ecological succession influenced by the major disturbances of stand replacement fire and stand replacement insect infestation is the dominant ecological process on the North Fork landscape.

Without major disturbance, natural succession moves vegetation communities toward late seral stages and increases stand density. Disturbance processes such as wildfire, insects/disease, timber harvest, and prescribed fire have the opposite effect and move vegetation communities toward early seral stages. These disturbance processes in combination with lesser impacts such as wildlife use have helped shape the existing vegetation composition and structure in the analysis area. National Forest System lands in the area are composed of stands of non-forested, sparsely forested areas, and forested lands. The dominant forested types are lodgepole pine and spruce-fir in the higher elevations and Douglas fir in the lower elevations.

Figure 8 displays the acres by forested cover type and structural stage (seral stages) of each forested type within the analysis area. Figure 9 is a map of the analysis area that shows distribution of forested cover types, and Figure 10 is a map that shows distribution of forested structural stages (or seral stages) in the analysis area.

Figure 8. Existing forested vegetation types and structural stages within the analysis area.

Primary forested cover type	Forest Structural Stage[11] in Acres								Total acres % of forested
	1	2	3A	3B	3C	4A	4B	4C	
Douglas-fir forest type	-	182	1421	702	1546	84346	50305	22053	160,555 47%
Lodgepole pine forest type	9761	43464	228	1029	1189	1601	7485	8194	72,951 21%
Spruce/fir forest type	-	-	396	276	1368	17646	32531	17335	69,552 20%
Whitebark pine forest type	-	-	-	-	-	30146	4026	-	34,172 10%
Limber pine forest type	-	-	-	-	-	4120	-	-	4,120 1%
Cottonwood forest type	-	-	-	-	-	365	12	-	377 <1%
Aspen forest type*	-	-	265	45	-	-	-	-	310 <1%
Juniper forest type	-	-	44	-	-	-			44 <1%
Total Acres/% of forested**	9761 3%	43646 13%	2354 <1%	2052 <1%	4103 1%	138224 40%	94359 28%	47582 14%	341,067 100%

*These figures are approximate due to lack of inventory of aspen as a codominant species

**These figures do not include changes as a result of wildfires in 2003.

1 Structural stage 1 = grass/forb; structural stage 2 = shrub/seedling; structural stage 3A = small to medium diameter (1 to 9 inches), less than 40% crown closure; structural stage 3B = small to medium diameter, 40 to 70% crown closure; structural stage 3C = small to medium diameter, greater than 70% crown closure; structural stage 4A = large diameter (greater than 9 inches), 40 to 70% crown closure; structural stage 4B = large diameter, 40 to 70% crown closure; structural stage 4C = large diameter, greater than 70% crown closure.

Figure 9. Timber types within the analysis area.

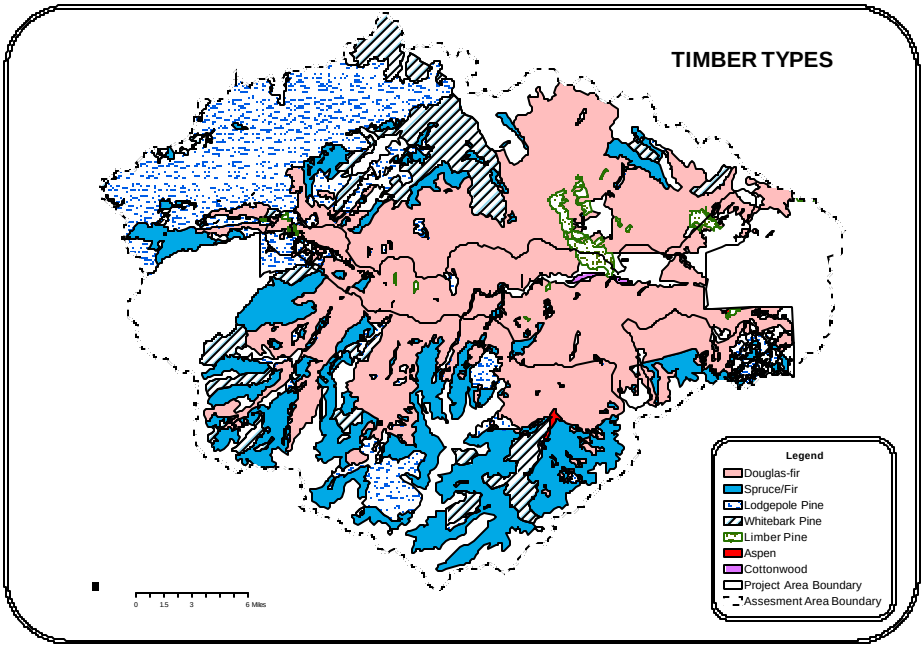
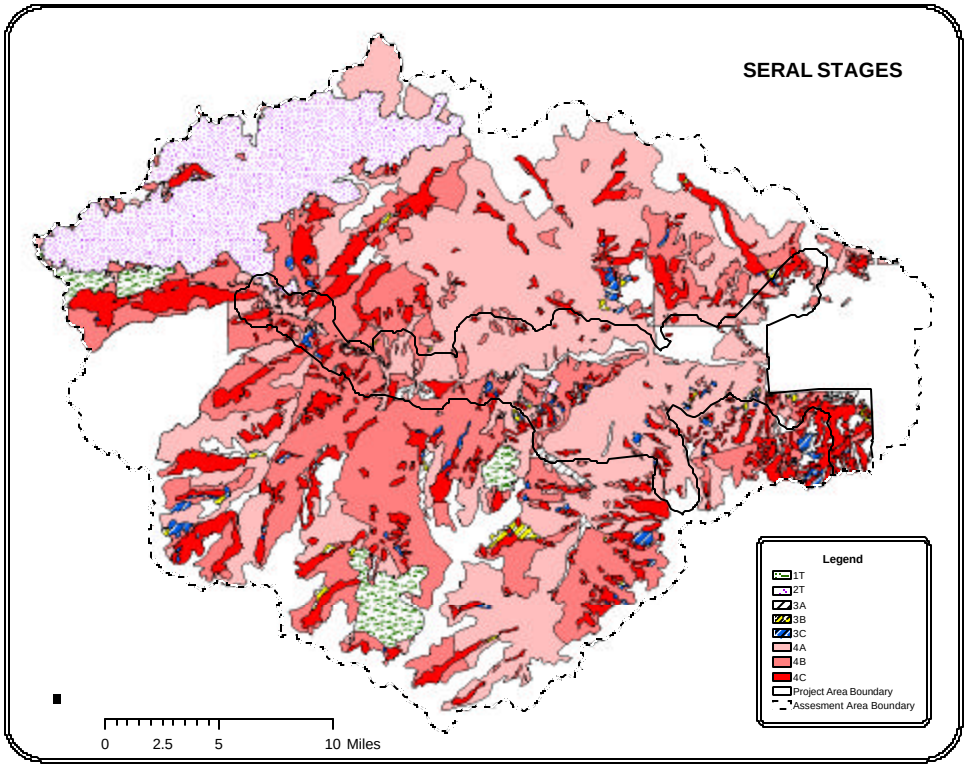


Figure 10. Seral stages within the analysis area.



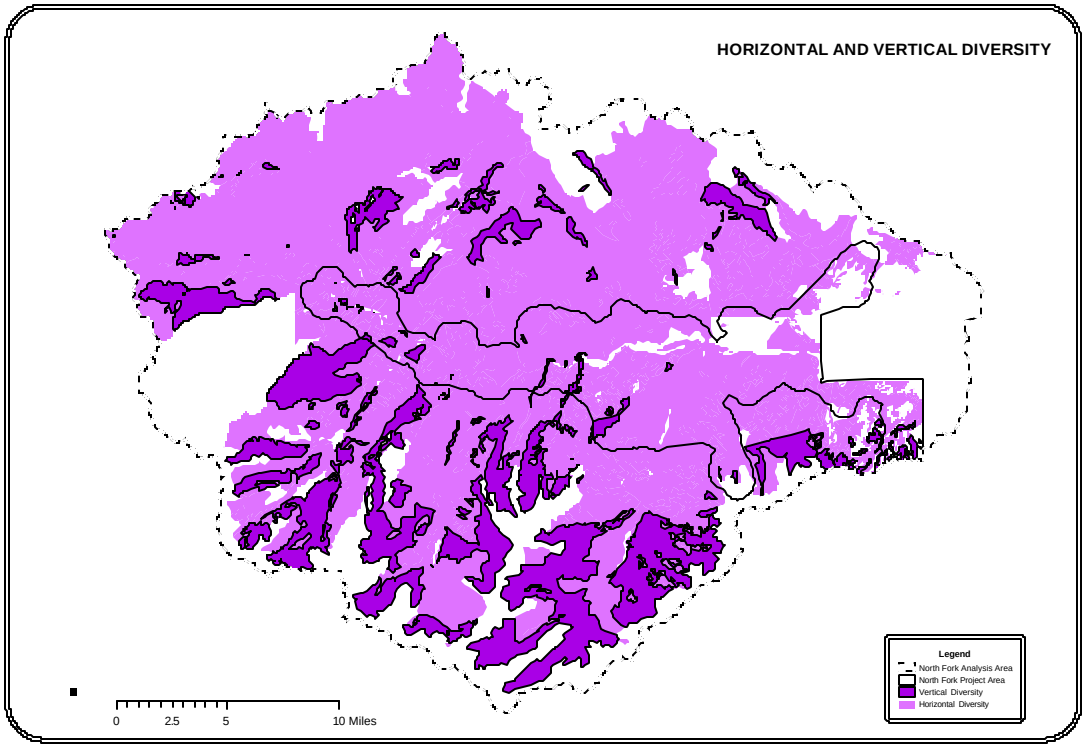
Prior to the recent insect epidemic, the forested stands in the analysis area were a mixture of single and multiple canopied stands, with the majority (over 80%) being in a mature to over-mature seral state, with post-1988 burns from the Yellowstone fires being in early seral stages and

comprising an additional 16% (not counting 2003 burns). Areas harvested in the past three decades constitute less than 1% of the analysis area. Recent insect activity is moving many of the forested stands back to earlier seral stages, and canopy coverage is decreasing in those stands. Because of the rapidity of the changes in stand conditions, inventory data was updated to reflect stand conditions as they were expected to be in the fall of 2003. Conditions were estimated by the project silviculturist based on his experience and field reconnaissance the past several years.

Vertical Diversity

Vertical diversity relates to the complex vertical structure composed of multiple age classes and multiple layers within an uneven-age timber stand. Currently 67,512 acres (20%) of the forested stands in the analysis area provide vertical diversity. This is at the 20% level established as a minimum desired condition by Forest Plan direction. The epidemic infestation of bark beetles in the analysis area that is killing many of the overstory trees is the major cause of this low percentage. Before the insect epidemic, additional stands provided vertical diversity. Few stands within the project area are presently providing vertical diversity and the number is decreasing. Stands possessing vertical diversity are shown in Figure 11.

Figure 11. Horizontal and vertical diversity in the analysis area.



Effects. Under the No Action alternative, it is expected that the percentage of vertically diverse stands will decline even more as the epidemic continues. Over the long term, vertically diverse stands will increase as the stands mature and shade tolerant species regenerate under a mature overstory. This process is likely to take 50 to 100 years.

The action alternatives do not contribute to any measurable degree in the decline of vertical diversity that is already resulting from natural disturbance. All harvest treatments are designed to minimize the loss of vertical diversity by maintaining the majority of the healthy live overstory trees. Prescribed burning treatments could accelerate the decline in vertical diversity in stands where a mix of earlier age classes presently exists. Under the action alternatives stand treatment

by mechanical methods would accelerate the growth rate of existing understory trees to a minor degree by increasing sunlight and moisture. This effect is caused by the removal of large tree boles that are presently providing some shading. There is no measurable difference among any of the alternatives relative to levels of vertical diversity within the analysis area.

Horizontal Diversity

Horizontal diversity relates to the structure " between stands" across a landscape caused by differing age-classes (age classes also relate to habitat structural stages or seral stages). Natural disturbances of epidemic levels of insect infestation and stand replacing wildfire tend to cause multi-age stands having vertical diversity to be converted to earlier seral even-age timber stands that contribute to horizontal diversity. The proportion of even-age stands (stands having only a few age classes or layers of vegetation) contributing to horizontal diversity (274,582 acres or 81%) is well above the minimal desired condition of 30%; however, even-age stands are not well distributed within the landscape (*see* Figure 11).This poor distribution is most likely the result of fire suppression over the past half century. The percentage of stands providing horizontal diversity is expected to exceed Forest Plan standards for the foreseeable future, until natural succession replaces the even-aged stand structure with multi-layered uneven-aged stands of trees.

Effects. With or without management, there will be an upward trend toward even-age stands of various seral stages distributed across the landscape that contribute to horizontal diversity. Even-aged stands will continue to be established as the insect epidemic runs its course. Harvest treatments would be removing primarily dead and dying trees, so they would have minimal effects on this trend. There is no measurable difference between the alternatives' effects on horizontal diversity, as it would increase under any scenario.

Grass/forb Structural Stage

The grass/forb seral stage is the earliest stage in forest succession where grasses and forbs are the dominant vegetation within a timber stand as trees are just reestablishing. Such stand conditions normally result from a clearcut, stand-replacement fire, or a stand replacing insect epidemic where all age classes of trees are killed. The grass/forb seral stage within the forested portion of the analysis area is presently greater than the Forest Plan minimum desired condition of 5%; however, the distribution is very poor. Three percent (9,761 acres) of the forested stands provide grass/forb habitat, with most occurring in burns taking place over the past decade. This figure does not include the 2003 fires, which would bring the percentage to over 5%.

Effects. Under the No Action alternative, the percentage of forested area in the grass/forb stage will increase as more of the overstory succumbs to the epidemic.

Under the action alternatives, mechanical harvest treatments would have little effect on grass/forb stage. The areas from which dead and dying trees would be removed and that have little advanced regeneration, are already reverting to grass/forb seral stage. The prescribed burning in the action alternatives would result in an increase of grass/forb habitat on burned acres.

Approximately 13,404 acres are included within the burn treatment areas. Assuming 80% of the prescribed burn areas are forest types, and if a 50% burn is achieved, approximately a little over 5000 acres would revert to the grass/forb seral stage. Burning would kill small, scattered pockets of advanced regeneration throughout the burned stands. These pockets would provide additional grass/forb seral stage and contribute to stand diversity over the long term due to increased species composition.

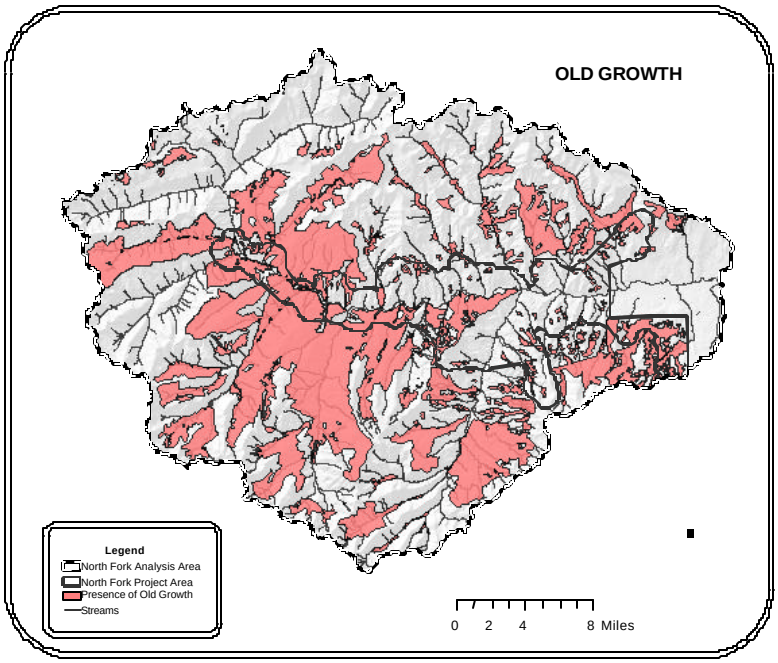
Old Growth

Old growth is a stage of forest development characterized by large components (e.g., many vegetative tiers, dense canopy cover, many large snags, high levels of dead and down logs, many large live trees) and structural complexity. These attributes vary as a function of vegetation type, site conditions, and disturbance history. Older age late succession forests may or may not have all

the components contributing to old growth, and few if any, patches will meet strict criteria for old growth once insect infestations has run its course. Old growth characteristics develop gradually as forests mature; there is no specific threshold where older mature stands become old growth.

Currently, 141,929 acres (42% of the coniferous forest type) of old growth exists in the analysis area and an additional 40% is mature forest possessing some characteristics usually associated with old growth (*see* Figure 12).

Figure 12. Old growth stands in the analysis area.



For the purpose of this analysis, old growth was classified as conifer stands in a 4B or 4C structural stage. Currently, the area exceeds the Forest Plan minimum desired condition of 10%, but those characteristics of old growth associated with large live trees is rapidly declining due to loss of the majority of large trees to the insect epidemic.

Effects. Under Alternative 1, the continuing insect epidemic is expected to result in mortality of the majority of the large mature Douglas-fir and spruce overstory trees. This will result in a continuing decline of old growth acres, which presently constitutes approximately one third of the forested area. The Forest Plan standard is to retain 10% of the forested area in old growth. Under Alternative 1, it is probable that 10% or more of the forested stands would retain old growth characteristics linked to large live trees; however, there is no way of knowing the final extent of mortality at this time.

With the action alternatives, there would be some treatments within old growth stands presently inventoried as old growth. However, the majority of these stands are no longer suitable as old growth. This is because they have recently lost the live canopy and large live trees characteristic of old growth due to insects. As such a small area is being treated in the context of the total analysis area, and as the amount of old growth available is being controlled primarily by natural disturbance factors, the action alternatives would have little effect on the total amount of old growth maintained in the analysis area. Based on the 2003 baseline data, mechanical treatments in Alternative 2 contribute to reduction of old growth acres by approximately 685 acres, and

Alternative 3 mechanical treatments contribute to reduction of old growth acres by approximately 481 acres.

In the action alternatives, 2,232 acres with old growth characteristics could be potentially affected by prescribed burning. Few true old growth stands would be burned, as most burning within a burn unit would not be targeting old growth unless it was already dead. In addition most burning would occur or drier sites not containing old growth. Assuming 50% of these older stands were unaffected by insect mortality and the other 50% were burned, there would potentially be a little over 1,000 acres (less than 1%) of old growth reverted to earlier seral stages by burning. The burning would likely maintain many overstory trees, but high levels of dead and down components would be lost within burned stands.

Snags and Dead and Down

Numerous snags of all sizes exist throughout the forested portion of the analysis area because of the presence of older forests, large recent burns, and recent insect infestation. The exceptions where snags are not prevalent is around developments and immediately adjacent to roads. They have been removed in these areas as they presented an unacceptable safety hazard or were a convenient source of firewood.

Thousands of acres of forested areas are experiencing heavy mortality of larger trees and recruitment of large numbers of snags is occurring. Snag availability, abundance, and distribution on a landscape basis have increased exponentially in the past decade, and will continue to increase in the near future. Current snag levels are far above the Forest Plan minimum desired condition of six to ten snags per 10 acres. Due to the magnitude of the insect killed trees, the existing number of snags has not been available in the analysis area for decades, or possibly even centuries.

For the analysis area, the abundance and distribution of dead and down material is variable, but presently exceeds Forest Plan standards. As with snags this component is increasing and is expected to increase substantially in the near future throughout the non-treated areas.

Effects. Under the No Action alternative, a tremendous increase in recruitment of snags would occur in the short term, contributing to the diversity (abundance and distribution) of this component within the analysis area. In the long term, these snags would fall to the ground adding substantially to the accumulation of presently existing dead/down material. Over the long term (40+ years) there would be a much reduced level of large snags, as recruitment of large live trees that will contribute as large snags upon mortality will not exist for many years**.**

Under the action alternatives, all fuels treatments are designed to reduce the levels of snags and dead and down materials from existing levels in and adjacent to developed areas. In some cases, this decrease would be dramatic, but all treatments are designed to maintain snag and dead and down levels at or above Forest Plan minimums. Within harvest units, six to 10 snags per 10 acres, eight inches or more in diameter at breast height (DBH), would be left where available. The snags would be retained in clumps if feasible. In addition, a minimum 50 linear feet of dead/down logs per acre that is more than 10 inches DBH would be maintained.

The differing treatments would result in differing post treatment levels of these components. Prescribed burning in timbered areas would result in the reduction of dead and down material with some snags also being lost. Currently standing snags not consumed by fire will contribute to dead and down material as they fall. With mechanical treatment in harvest areas, snags and dead and down would be reduced to Forest Plan minimums. In the remainder of the analysis area, snags and dead and down material would remain well above the minimum desired condition, and recruitment of high levels of snags and dead and down would continue for several decades.

Aspen

USDA General Technical Report RM-119, 1985 Regional Guidelines for Managing Aspen, and reports specific to aspen on the Shoshone National Forest by Gordon Gullion were the basis for this discussion. Based on Forest Plan direction, aspen is to be emphasized to provide wildlife habitat, enhance visuals, and maintain diversity (management area 4D, FP pages III-153-154). Aspen stands are to be maintained and improved, and other tree species are to be de-emphasized if present. Aspen is extremely important to many wildlife species, including Forest Management Indicator Species ruffed grouse, moose, elk, deer, beaver, and hairy woodpecker, as well as many other species that are use aspen and its associated understory vegetation. In addition to diversity and wildlife, aspen is important for aesthetics and watershed protection. Clear cutting or prescribed fires are generally the most appropriate treatment methods for regenerating aspen stands.

Aspen is a minor cover type in the Absaroka Mountain Range portion of the Shoshone National Forest, generally comprising less than 4 to 5% of the forested vegetation. Aspen (*Populus tremuloides*) is an early seral, pioneer species commonly competing with invading conifers during later states of succession. Individual aspen stands (clones) are generally short-lived (80-150 years) without major disturbance that kills the large above ground stems; however, when regenerated by periodic disturbance the clones can live for thousands of years. Establishment of new clones by seed dispersal is not a common occurrence.

Aspen is generally classified within two general types. One type is self-perpetuating aspen, which is multistoried and regenerates without major disturbance, and is sometimes referred to as indeterminate aspen. There is very little of this type of aspen on the northern portion of the Forest. The other type of aspen, which is the dominant aspen type on the Forest, is referred to as determinate or even-age aspen, and is a seral community within a coniferous forest type. Although both types can be encroached upon by other species, the even-aged or determinate stands are at highest risk for elimination from an area. Without major disturbance factors such as fire, flood, mechanical treatment, etc. that kill the larger stems, degeneration of even-aged clones continues over time until they eventually die out.

Effects. Under the No Action alternative earlier seral deciduous species such as aspen and willow would increase a relatively small amount in abundance and vigor in wetland, riparian areas, and other moist sites due to reduced competition from conifers for sunlight and moisture. On the drier sagebrush and meadow types where aspen occurs, conifer encroachment by limber pine and Douglas-fir would continue. The abundance (acreage), distribution, and overall condition of aspen clones can be expected to continue to decline within the analysis area until natural disturbance such as a wildfire occurs of such magnitude as to cause regeneration.

Many aspen clones will likely be lost if such disturbance does not occur in the near future. This is due to competition from conifers for light, moisture, and nutrients, and the inability of the majority of the aspen clones to regenerate without the presence of major disturbance.

Under the action alternatives, some aspen clones within the treatment areas would be released by removing immature conifer. This would result in some change to the vigor and abundance of aspen due to the removal of conifers from aspen stands. With reduced competition from conifers due to removal, and regeneration of aspen clones where appropriate, the size of clones, the density of stems, and growth rates would increase. With scheduling of regeneration in the future to achieve a variety of age classes per unit area, distribution of age classes (horizontal structure) of clones would also be enhanced. Establishment of numerous vigorous suckers (6,000 to 12,000 per acre) would be expected in regenerated clones.

Both action alternatives will increase aspen in the project area, by favoring aspen where it occurs as remnants in the treated areas. The prescribed fire treatments are also likely to enhance aspen where it occurs. Alternative 2 will have a greater effect than Alternative 3, because it treats more

acres. It is not possible to quantify these effects, because of the scattered nature of the remnant aspen clones.

A concern that must be considered when planning for aspen treatment is the protection of regeneration from overuse by both livestock and wildlife. Based on the evaluation of aspen clones that were treated over the past 30 years on the northern portion of the Forest, overuse by wildlife (even on winter range) has not been a problem. It is speculated this is because most of the elk winter ranges are grassland types, and so long as sufficient grass forage is available elk prefer grasses over browse except when grasses are unavailable due to deep snow.

Livestock use has resulted in problems only in a few, small areas where cattle concentrate, such as shaded areas near water. Only a small portion of the analysis area has permitted livestock use, and protection of aspen regeneration is a design requirement (see Section 2.2.4) and would be implemented as needed.

3.1.2 Forest Health

Forest Plan direction stresses utilizing principles of integrated pest and vegetation management to prevent or reduce serious, long lasting hazards and damage from pest organisms (FP/III-6, 8, 10, 97). On non-wilderness lands, the objectives are to manage fire, insects, and disease to avoid catastrophic events. Other excerpts of Forest Plan direction include:

- Improve the health and vigor of vegetation types outside wilderness (FP/III-6).
- Consistent with the relative resource values involved, prevent or reduce serious, long lasting hazards and damage from pest organisms, utilizing principles of integrated pest management (CFR 219.27 (a)(3) and Plan III-97).
- Implement integrated pest management to prevent and control insects and disease (FP/III-8).
- Reduce damages by insect, disease, and other forest pests to acceptable levels through integrated management of vegetation (FP/III-10).
- Prevent or suppress epidemic insect and disease populations that threaten forest tree stands with an integrated pest management approach (FP/III-97).

Insects and Disease. The current insect epidemic is having a substantial impact on the current forested stands by killing the majority of the overstory trees, creating red needled stands that are highly susceptible to crown fire. Figure 13 shows the areas of insect mortality in the analysis area in 2002 and 2003. Areas affected in 2002 include 48,216 acres and 23,534 acres in 2003. All conifer species are being affected by insect infestations from Douglas fire beetle, spruce beetle, mountain pine beetle and balsam fir beetle. White pine blister rust is having a substantial impact on both whitebark and limber pines by stressing them in combination with the current drought causing high mortality.

There are several beetle management actions that are occurring on a small scale within the area. Firewood removal and small commercial sales to remove hazard trees and hazardous fuels from campgrounds and cabin/lodge areas have occurred recently. In addition, anti-aggregation pheromones are being installed around high-risk areas such as campgrounds and lodges. These pheromone capsules have been effective the past two years and are planned for use in the future.

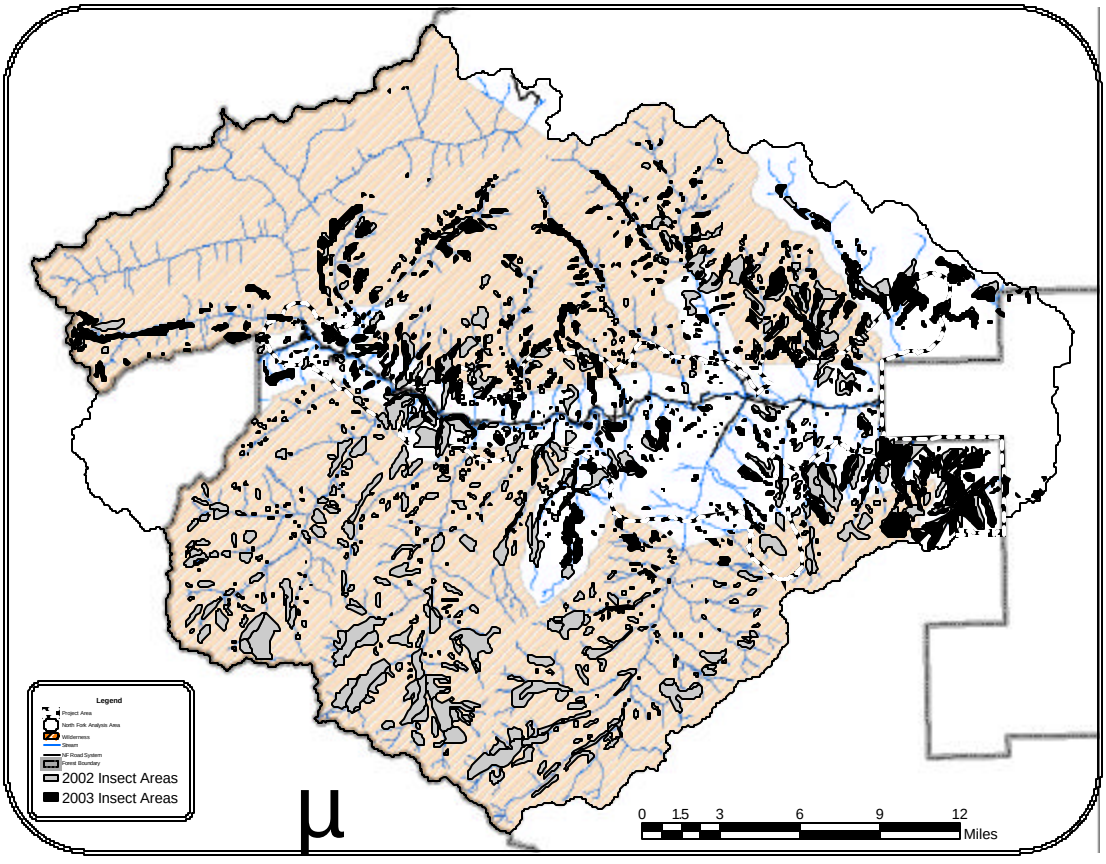
Epidemic insect infestations are natural thinning processes associated with old age or highly stressed forestland. The primary purposes of treatment after an epidemic has occurred is generally to salvage any usable products, to reduce the risks of wildfire, or for restoration purposes relating to high value resources, wildlife, visuals, etc. The purpose for initiating treatment, and the design of treatment is not insects per se, but the issue of hazardous fuels and wildfires and other resource concerns relating to the existing or potential stand conditions.

In summary of the affected environment, the entire analysis area is highly susceptible to a multitude of insect and disease infestations, and the Douglas-fir beetle and spruce beetle infestation is at or near epidemic levels over the entire analysis area. Numerous Forest Health Surveys, Reports, and Biological Evaluations for Region 2 are found on the internet at http://www.fs.fed.us/r2/fhm/ under the "Reports" section.

Effects. Under Alternative 1, no fuel reduction or vegetation management for forest health would take place. Plant communities in the area have evolved with fire as a naturally reoccurring events and are adapted to fire. Vegetation can benefit from wildfire or prescribed burning. Under Alternative 1, in the event of a wildfire, the long term effects would be beneficial to vegetation and forest health, depending on the size of the area burned and whether favorable environmental conditions exist. The same hold true for prescribed burning under the action alternatives.

The insect epidemic will continue to cause high mortality and an increase in hazardous fuels conditions. The effect to forest health is, as the needles fall off the trees, crown fire potential will be reduced although it is expected that the dead trees would begin to fall in the next 5-20 years creating a jackstraw of down fuels that when ignited would burn intensely causing high mortality of the regeneration and co-dominate trees remaining after the insect epidemic.

Figure 13. 2002 & 2003 insect mortality.



It may not be possible to prevent the spruce and the Douglas-fir beetle epidemic from impacting most of the denser, larger-diameter, more pure stands and areas of Douglas-fir, as the majority of the older, larger trees have already succumbed to the infestation. This mortality has occurred everywhere, regardless of tree density or species composition. The potential for insect and disease

disturbances would decrease as mature live trees succumb to the infestations. Under the action alternatives would not affect the course of the beetle epidemic given its advanced stage.

3.1.3 Forest Products

In considering silvicultural practices and forest products offered for sale in the recent past, there have been commercial timber sales at Kitty Creek and 50-mile in the tentatively suitable timber base. Other projects include a small commercial sale in 1998, located south of the west loop of Newton Creek Campground, where approximately 150 dead trees were removed by horse logging. In 2001, a small sale was completed to remove hazard trees at the Eagle Creek campground. Recently, two small sales around Blackwater Lodge and the Boy Scout Camp were completed to remove dead, dying and high-risk hazard trees around these facilities. In 2004, mechanical fuel treatments implemented by timber salvage will begin in the Eagle Creek area.

Effects. The No Action Alternative is not responsive to the purpose for action. Under the No Action Alternative, there would be no check on the accumulation of fuels that is occurring in the analysis area and no forest products offered for salvage as part of fuel reductions.

The action alternatives reduce fuels within the project area with the effect of creating areas that will have lower fire intensities. These areas of lower fuel loadings will provide an opportunity for fire crews to contain the growth of fires that may start in the analysis/project area and indirectly would lessen the chances that forest products would be lost in an expansive wildfire.

Alternative 1 does not provide any commercial sawtimber-sized products. Under the action alternatives, a secondary effect or benefit would be the economic use of materials removed during the fuels treatments. Wood products, including sawtimber and fuelwood are a result, since both action alternatives provide for the removal of wood products to reduce fuels. Salvage would be from both tentatively suited lands and other lands for the purpose of resource protection as stated in the Forest Plan[12]. The long term health and future economic value of commercial conifer species would be managed on suitable timber lands.

Though not the primary purpose, the activities use both timber salvage of dead and dying trees and fuelwood gathering as a way to utilize the fuels that are being removed from the site. These alternatives meet the Forest Plan goals of providing wood products while reducing fuels (*see* Figure 14).

Figure 14. Summary of the effects of the action alternatives for forest products.

	Alternative 2	Alternative 3
Suitable Timber Acres	113 acres (units M29, M33)	113 acres (units M29, M33)
Non-Suitable Acres	1530 acres	1090 acres
Estimated Volume	10.19 mmbf	7.61 mmbf

3.1.4 Rangeland

Since grazing was not raised as an issue and the proposed action has little affect on grazing, the discussion related to rangelands and will not be discussed in depth. Commercial or permitted

[12] The Shoshone Forest Plan designated other areas unsuitable for timber production for multiple use purposes. NFMA implementing regulations at 36 CFR 219.27 (C)(1) establish exceptions for harvest of timber from unsuitable lands. All recovery of forest products proposed in this analysis from unsuited lands is designed to meet resource objectives other than timber production (wildlife habitat, diversity, fuels treatment) or is designed for salvage and is therefore consistent with NFMA established exceptions.

livestock grazing (*see* Figure 15) occurs in the analysis area and involves 44, 316 acres on these allotments:

Figure 15. Grazing allotments in the analysis area.

Allotment Name	Acres	Management	Dates and Permitted Use	Comments
Dunn Creek	4,539	4 pasture /modified deferred rotation	88 cow/calf from 7/1-10/15 409 AUMs	Used in conjunction with BLM grazing allotment and private land uses
Big Creek	17, 074	2 pasture /deferred rotation	17 horses 6/16-10/15 82 AUMs	
Green Creek	4,717	3 pasture /modified rest rotation	30 cow/calf 6/16-10/15 158 AUMs	Used with BLM grazing permit
Hardpan/Table Mountain	13, 486	4 pasture /modified deferred rotation	492 cow/calf 7/1-10/15 2285 AUMs	
Crow Creek	4,000	1 pasture /deferred	20 horses 7/1-8/31 49 AUMS	
Grinnell Creek	500	1 pasture /deferred	15 horses 7/1-9/30	

Effects. Under Alternative 1, there would be no effects as there would be no treatments and no changes to the grazing allotments or livestock management. Monitoring shows that the resources on the allotments are meeting or satisfactorily progressing toward forest plan objectives for livestock grazing management.

With the action alternatives, there would be minimal effects to livestock grazing because of mechanical methods to treat fuels or prescribed burning activities. The amount of transitory range created through the proposed and possible future timber harvests or fuels reduction would have minimal effect on stocking capacity.

Deferred grazing through rest/rotations would continue to be coordinated with permittees. Resting all burned areas for one to two growing seasons after the burn to ensure rapid revegetation and promotion of desirable native plant species would impact the livestock permittee. The livestock operator and livestock grazing within the treatment areas would be affected by proposed management activities; a temporary decrease in available range would result by restricting cattle use in aspen treatments while aspen regeneration takes place if monitoring determines a need.

Livestock grazing needs to be coordinated to protect treated areas from livestock following treatments. The effect to commercial livestock grazing is that all burn areas are to be managed to ensure that desirable native plants are able to regenerate and reproduce based on the size and intensity of burns, precipitation, location of the prescribed burns, etc. The Forest Service would coordinate closely with the permittees and facilitate use of alternate areas such as grazing banks, other allotments in non-use, etc. Structural range improvement locations are known and would be avoided; therefore, no damage to these improvements are projected.

3.1.5 Sensitive Plants

Twenty two plant species on the Region 2 sensitive species list that are known or suspected to occur on the Forest were used. A review of the habitat requirements of those species in relation to the habitats in the analysis area is displayed in the project file. Additional documentation can be found in the North Fork Watershed Assessment. According to the literature review, five of these plants may possibly occur within the analysis area. However, a field survey has not been completed but is scheduled to occur in the summer of 2004. Any new information would result in small unit boundaries changes to avoid sensitive species.

Effects. Under Alternative 1, no management effects would occur to sensitive plants. For the action alternatives, it was concluded that no impact would result from roads, timber harvest, and prescribed burning activities on most sensitive species because they are generally not found in areas where harvest activities would occur or are found in areas where low fuels occur (i.e. scree slopes) where burning activities would not occur. Forest Plan goals and supporting standards and guidelines affirm maintaining sensitive plant species and their habitats and provide a framework for implementation and monitoring. No inconsistencies with Forest Plan direction for sensitive plant species were identified and there would be no adverse effects to sensitive plants.

Determination

Absaoroka goldenweed, Absaroka Range beardtongue, Entire-leaf goldenweed, North Fork Easter Daisy, and Wyoming tansymustard are the five sensitive species with possible occurrence in the analysis area. Because of the above factors, any of the action alternatives "may affect individuals but are not likely to cause a trend to federal listing or loss of viability of sensitive plants."

3.1.6 Invasive Weeds

This project has a moderate weed assessment rating due to the current presence of noxious weeds within and adjacent to the analysis area. It is difficult to determine the historical presence or extent of invasive plant species. An assumption is that they were less extensive than current conditions due to the lack of activity in the area. The primary carriers of invasive plant species, vehicles and livestock, were less intrusive in this area in the past compared to the present. Invasive plants exist and will continue, especially if recreation use of the area and the role of fire are allowed to expand.

Invasive plant seeds are easily dispersed by vehicles and tend to follow and spread along road corridors, trailheads, stock trails, and campgrounds. Currently there are mapped populations of canada thistle, hoary cress or whitetop, dalmation toadflax, spotted knapweed, leafy spurge, houndstongue, common burdock, musk thistle, wild licorice and common mullein in the analysis area. Current levels are poised to expand rapidly if the right environmental conditions occur.

Invasive species associated with revegetation efforts along the Buffalo Bill Cody Scenic Byway include smooth brome, timothy, cheatgrass, goatsbeard, prickly lettuce, and yellow sweet clover. Of these species, yellow sweet clover is moving outside of the road right-of-way, displacing native plant communities.

There is a good potential for the introduction and spread of the following species: oxeye daisy, diffuse knapweed, common tansy, and yellow toadflax. Emergency re-seeding efforts that followed the Clover-Mist fire resulted in the introduction of Cicer's milkvetch into the analysis area. This plant was supposed to have been short lived; however, it has proven to be long lived, particularly within riparian areas.

Effects. For Alternative 1, no increased ground disturbance would occur. Only the current levels of weed treatments would occur, as funds are available.

For Alternatives 2 and 3, all of the above invasive weed species pose a competitive threat to sensitive and rare plant populations in the analysis area. Native bluebunch wheatgrass, Wyoming big sagebrush, basin big sagebrush, and cottonwood plant communities are particularly vulnerable to being dramatically altered by invasive species. Spotted knapweed, whitetop, and yellow and dalmation toadflax are the greatest threats.

Under the action alternatives, an increase in weeds would occur due to moderate ground disturbance, canopy loss, road use and maintenance, and vehicles. Existing populations, such as Canada thistle, are likely to increase. Fuel reduction actions may require additional effort to

manage invasive species. Monitoring of the project would occur with follow-up weed treatment as needed in accordance with the existing noxious weed EA for the Forest. Because of these treatments and project design features (*see* Section 2.2.4) that would be used to reduce the spread of noxious weeds, the effect would be a moderate increase in weeds.

3.2 Wildlife

Wildlife is addressed relative to several different categories: general habitat conditions, listed (threatened and endangered) species, regionally designated sensitive species, Forest Management Indicator Species (MIS), and Wyoming Priority Bird Species.

The biological evaluation process for determination of effects to threatened and endangered species has been completed, and a summary of the results is incorporated into this EA. The biological evaluation relative to designated sensitive species and management indicator species is incorporated into this EA.

The focus of this analysis is the 69,459 project area (includes a .5 mile buffer around the 118 treatment units) that is being directly affected by treatment. This analysis was completed using both a fine scale project area view and a broader mid-scale landscape view, while considering the daily, seasonal, and annual needs of wildlife species of concern. Fine-scale analysis will address a project area scale of the areas being directly affected, and will relate to the average daily cruising radius of an individual of a species during critical seasonal periods (i.e. post emergence/young rearing).

Mid-scale landscape analysis will address indirect effects on a landscape area (418, 240 acres) that relate to the average annual home range of an individual of a species. Broad coarse-scale effects analysis relative to large geographic areas relates to the total range of a population or a subpopulation of a species. Discussion of effects on a broader coarse-scale is not appropriate in this document except as required by NFMA to address this project in the context of cumulative effects, population trends, and viability on a Forestwide scale.

3.2.1 General Habitat Discussion

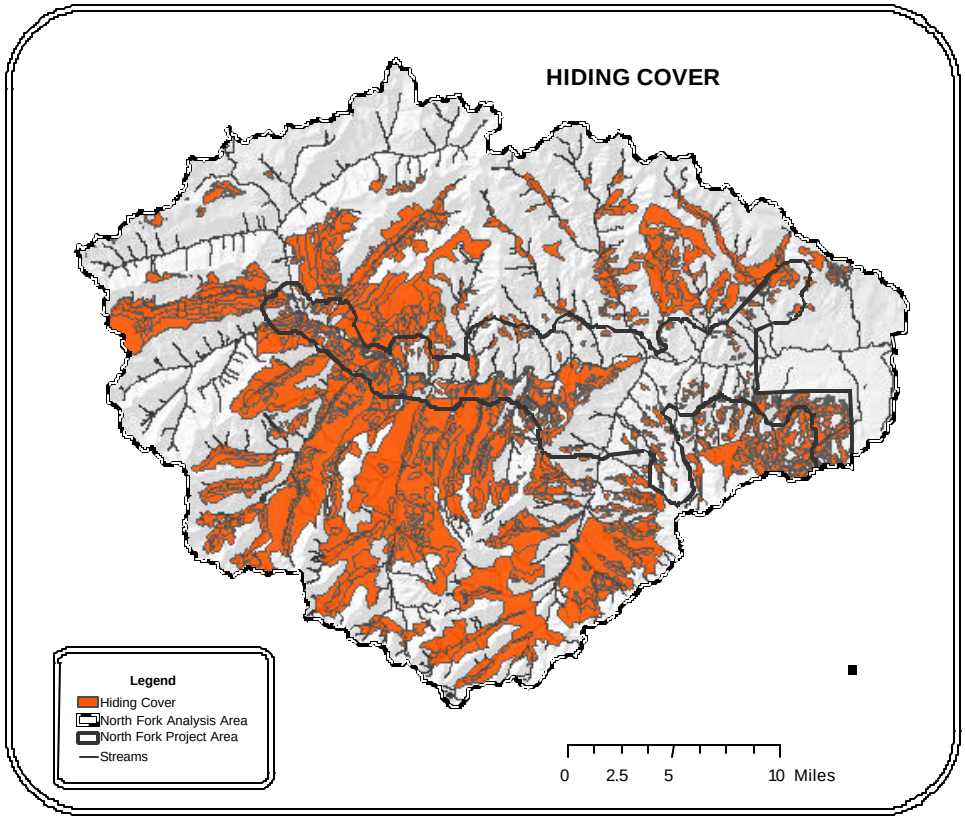
Analysis and discussion of vegetative components of diversity (vertical diversity, horizontal diversity, grass/forb stage, old growth components, and aspen) are discussed in the vegetation section of this EA (*see* Section 3.1). Analysis and discussion of riparian areas and wetlands are contained in the aquatics and watershed section (*see* Section 3.3). The following discussion relative to wildlife is based on habitat relationships and changes in habitat components. Discussion in this section addresses components of diversity, riparian areas, and wetlands only in the context of habitat relationships.

Effects of the action alternatives on diversity, wildlife life habitat, and wildlife populations are relatively insignificant when considering the acreage of habitats being directly treated and the cruising radius and home ranges of individuals of different wildlife species in the context of the size and diversity of the analysis area (less than 4%), or in the context of the size, diversity, and availability of habitats Forestwide (less than 1%).

Hiding Cover. Vegetative hiding cover is defined as vegetation capable of hiding 90% of a standing deer or elk from the view of a human at a distance equal to or less than 200 feet. The animal is essentially hidden at this distance (Thomas 1979). Although the definition of hiding cover is specific to deer and elk, its application is beneficial to a multitude of species. Hiding cover is a management concept that addresses an individual animal's need for vegetative cover that provides for a feeling of security from natural occurring disturbances (primarily predators), thus allowing the individual to carry on with essential life functions without exhibiting avoidance behavior or changing its normal behavior or movement pattern. Maintenance of hiding cover is

not intended to protect deer and elk from hunters during the hunting season although sufficient amounts and distribution of hiding cover obviously contributes to some degree of security from a large range of human disturbance activities.Figure 16 shows the hiding cover within the area.

Figure 16. Hiding cover in the analysis area.



The insect infestation is causing tree mortality that is resulting in a reduction of vegetative components contributing to hiding cover. This is because adequate amounts of forest canopy related to larger trees and the needled limbs that allow concealment have declined, are continuing to decline in many stands, and a sufficient amount of smaller trees are not yet available to serve as hiding cover. Currently 47% (162,055 acres) of the forested acres in the analysis area are providing hiding cover, though the quality of hiding cover in some stands is marginal. The existing level of hiding cover is a result of the advanced regeneration and immature trees that occur in some stands. The existing level of hiding cover is greater than Forest Plan standard of 40%. An analysis of the hiding cover indicates that the direction in the Forest Plan relative to distribution of hiding cover is also being met within forested areas. Hiding cover is found along more than 60% of the perimeter of open meadows, along more than 75% of arterial and collector roads, and along more than 40% of the streams.

Effects on Hiding Cover. Under the No Action alternative hiding cover levels will decline in the short term as the insect epidemic proceeds since many more tree will be killed. Long term, hiding cover levels will increase due to high levels of forested regeneration. The standing dead material existing in the treatment area provides a limited amount of hiding cover for larger species; however, it is not adequate to hold animals in the absence of advanced regeneration during stressful periods such as hunting season. In the long term, the standing dead material will lead to excessive amounts of dead and down material that could easily restrict movement of large animals such as elk. This is in contrast to dead and down left after a fire; where substantial amounts of material burn up, resulting in less dead and down to restrict movement of big game.

High quality hiding cover, which requires dense stands of advanced regeneration, would take 10 to 30 years to be achieved in many areas.

Under the action alternatives there are few direct impacts to hiding cover caused by mechanical treatment; however, 2,432 acres of hiding cover could potentially be affected by prescribed burning. Assuming 50% of these stands were burned, there would potentially be a little over 1200 acres (<1%) of hiding cover lost in the short term as a result of burning. The decreases are the result of mechanical treatment and jackpot burning that reduces stand densities to a level that does not provide hiding cover. Both action alternatives are still well above Forest Plan minimums. This small decrease does not affect the distribution standards for hiding cover along openings, roads, and streams.

The action alternatives' removal of dead and dying trees in harvest areas reduces the likelihood of excessive dead and down material restricting big game movement in the long term. The removal of the standing dead and dying does reduce hiding cover provided by the boles of those trees. This is mainly a concern in areas that have narrow linkage corridors and where advanced regeneration is lacking. This effect would be that same as in the No Action alternative, except this it occurs sooner as the trees are removed by harvesting, rather than as they fall down over time.

The period for restoration of hiding cover would be enhanced slightly by the action alternatives due to removal of the dead overstory, which would allow enhanced growing conditions as a result of increased availability of sunlight.

Thermal Cover. Thermal cover is vegetative cover that is used by warm-blooded animals to assist in maintaining their body temperature. It is an important component used in thermal regulation for both heating and cooling. Thermal cover is defined as a stand of coniferous trees more than 30 acres in size, more than 40 feet tall, with an average canopy closure exceeding 70%, (*see* Figure 17).

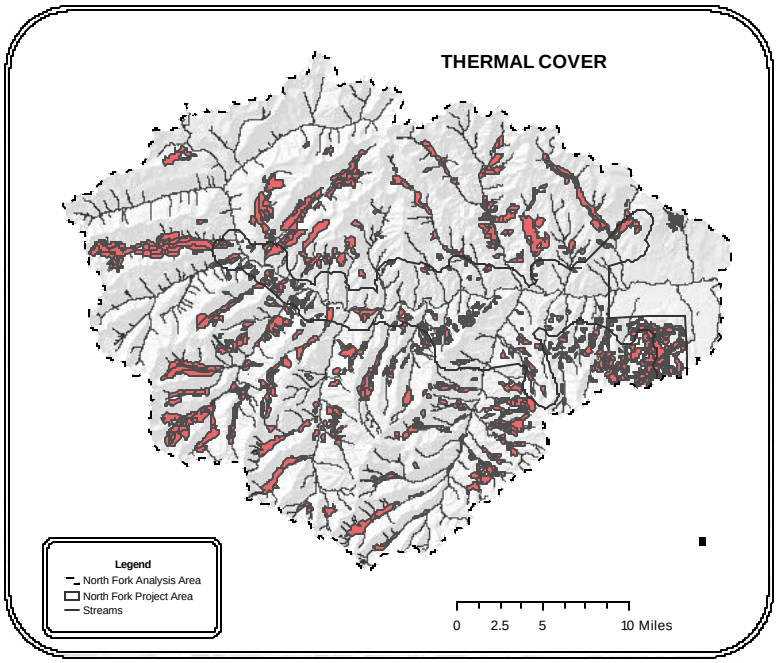
Standing dead trees are relatively ineffective in regulating thermal and solar radiation intensity at the ground surface. As a result, areas with little canopy cover possess few characteristics that contribute to thermal cover. Currently, 51,685 acres (15%) of the forested stands provide thermal cover in the analysis area. This low percentage is not a result of human-related activities, but is due to mortality from the insect epidemic. This is below the Forest Plan minimum desired condition of 20%. The 20% distribution standard for thermal cover along streams is also not being met, because of the overall lack of thermal cover throughout the analysis area.

Effects on Thermal Cover. Under the No Action alternative, thermal cover is likely to continue declining as the epidemic continues. It would require many decades (40 to 50 years) to achieve pre-insect infestation characteristics that provide effective thermal cover for larger animals.

Mechanical treatment within the action alternatives does little to reduce the acres of thermal cover. Prescribed burning in the action alternatives could potentially reduce thermal cover by 939 acres. Although such stands are not targeted for burning, burning could reduce stand densities in some stands to a level such that thermal cover is not being provided. Assuming 50% of these stands were burned, there would potentially be a little over 470 acres (<1%) of thermal cover lost in the long term as a result of burning.

None of the alternatives maintain thermal cover above the Forest Plan standard of 20% on a sustained basis over time.

Figure 17. Thermal cover in the analysis area.



Habitat Connectivity and Habitat Fragmentation. Large spatial scale habitat connectivity and habitat fragmentation is not a relevant concern with this proposal. Habitat fragmentation is the disruption of continuity in large-scale habitats, thereby converting suitable habitat to hostile habitat. While timber harvest or prescribed fire does change patch size and structural stage, this is not fragmentation in the sense that a hostile environment has been created that isolates and imperils species such as the grizzly bear. Habitat fragmentation cannot be addressed at the project level.

Fine scale habitat linkage (or travel corridors or movement corridors) provides individuals within a seasonal range adequate cover to allow daily movement to ensure that essential life needs are met. Seasonal migration corridors require sufficient cover to allow secure movement between seasonal ranges by individuals or groups. Localized travel linkage corridors and seasonal migration corridors are of concern due to the quality of the remaining cover.

The Forest Plan does not specifically provide standards for wildlife linkage corridors. However, compliance with Forest Plan hiding cover requirements (FP III/50-51) adequately provides conditions for maintenance of habitat connectivity and uninterrupted movement by individuals between habitat areas, thus providing security.

Effects on Habitat Connectivity and Habitat Fragmentation. Although of marginal quality in some stands, there is sufficient areas of tree cover and other screening vegetation in close enough proximity to each other to allow normal movement of all species along the North Fork Corridor, except for larger species during hunting season. The structural quality of forested cover is presently limited, and is declining naturally in and immediately adjacent to developments and structures along the corridor because many of the larger trees are dying, and younger age-class trees are absent. As boles of dead trees and large trees with few lower branches contribute little to quality wildlife cover, removal of hazard trees and salvage of dead trees will have little effect on security cover or wildlife movement in the short term. Opening of the canopy will enhance regeneration of trees, thus enhancing cover quality within travel corridors in the long term.

In addition, by conscious design during highway reconstruction, sufficient vegetation exists at intervals along the highway to allow unrestricted wildlife movement across the highway in most

situations during most seasons. Some conflicts and collisions do occur; however, there is little opportunity relative to vegetation retention or management to affect the situation one way or the other adjacent to the highway right-of-way.

The amount and quality of cover contributing to habitat connectivity would remain fairly constant within the treatment area under any of the alternatives. This is because the treatment areas are relatively small, and the trees that would be removed in mechanically treated areas contribute little to quality cover. The period for restoration of quality linkage corridors would be enhanced slightly in the action alternatives due to removal of the dead overstory. High quality cover for corridors would require advanced regeneration that would likely occur within 10 to 30 years.

Snags. This habitat component is also discussed in the diversity section (*see* Section 3.1). Snags provide important habitat for a variety of species—some are dependent on undisturbed burned areas, others are dependent on late succession forest, while still others need only a minimum density of large snags. The most number of snag dependent woodpecker species prefer aspen and subalpine fir, however, spruce, lodgepole pine, and Douglas-fir are used to some extent. Preferences are likely related to snag size, amount of heart rot, and community composition within an individual woodpecker's territory.

Leaving clumps of snags or blocks of unlogged habitat within logged areas provides habitat for most all snag dependent species. Numerous snags of all sizes exist throughout the forested area, and the presence of an old age forest and the associated insect infestation has created habitat for many snag related species that has not been available in the area for decades, or possibly even centuries. In addition, thousands of acres of forested areas in the analysis area are experiencing heavy mortality of larger trees thus allowing recruitment of many high quality snags in the future.

Effects on Snags. The No Action alternative will result in a tremendous increase in the number and distribution of snags throughout the analysis area in the next decade due to tree mortality associated with insect infestation. Snag numbers would remain relative stable for several decades when they become less firm and start falling.

With the action alternatives, a sufficient number and distribution of large sized snags would be retained in treatment areas, and large number of snags would be recruited over time in non-treated areas to provide amounts of habitat well in excess of pre-infestation levels for snag dependent species. Timber harvest would maintain available snag habitat by retaining clumps of snags within treated areas and by leaving some areas untreated. Prescribed burning would likely have some adverse effects on numbers of existing snags in the short term; however, burning would provide accelerated snag recruitment by causing mortality of some larger live trees.

Sagebrush Communities. Some areas of habitat planned for prescribed burning contain stands of mountain big sagebrush (*Artemisia tridentata vaseyana*). Sites having fertile deep soils and supporting dense stands of mountain sage communities respond positively to burning with an increase in grass and forb production in the short term, and appear to have had a relatively short fire disturbance return interval with vigorous regrowth of the sagebrush generally occurring within a 10 to 15 year period (Wrobleski and Kaufmann 2003). Poorer sites require a much longer time period to reoccupy the site. Sites planned for treatment range from a few highly productive sites to many less productive sites.

Most mountain sagebrush sites targeted for burning are in either a decadent condition (high percentage of dead) or heavily encroached by Douglas fir, limber pine, or juniper. The analysis area has sagebrush communities scattered along the corridor, with the majority being in the lower reaches and in areas where timber is very limited. The majority of mountain sagebrush in the analysis area is in later seral stages.

In the analysis area, as with most areas of the Forest, characteristic patterns for sagebrush are relatively small patches of sagebrush interspersed within and adjacent to forested areas. Extremely large expanses of continuous sage do not exist, thus habitat for interior sagebrush obligates requiring large continuous expanses of sagebrush does not exist. Within the North Fork analysis area, based on existing data these patches of sagebrush cover approximately 13,000 acres. This is probably low as an in-depth inventory of sagebrush has not been completed and many small stands are interspersed within other types.

Of concern relative to burning of sagebrush communities is the potential spread of invasive species such as cheatgrass. Small areas of cheatgrass do exist along the North Fork corridor; however, project design does not allow burning within 1/8 mile of areas containing this species. Invasive species are discussed in Section 3.1.6.

Most wildlife species dependent on sagebrush communities are associated with several seral stages for differing seasons or for differing functions (e.g., nesting, birthing, foraging, wintering, etc.). As a result, a diverse mosaic pattern of differing seral stages of sagebrush within the daily cruising radius of the dependent species is optimal.

Prescribed fire can affect sagebrush communities and the dependent wildlife species in many ways, and can produce both detrimental and beneficial effects dependent on the species of sagebrush and the site potential. Burning of a portion of highly productive mountain sagebrush sites enhances habitat for edge related wildlife species by increasing: the amount and quality of edge, interspersion of differing habitat niches, diversity and productivity of understory forbs and grasses, and the vigor of the sagebrush community over time. A management strategy that regenerates a portion of sagebrush communities over the natural disturbance return interval, on a sustained even-flow rotation basis on area sizes meaningful to dependent wildlife species, appears to be optimal for maintaining viable populations of all sagebrush dependent species.

Effects on Sagebrush Communities. Under the No Action alternative natural processes and disturbances influenced only by existing management activities and controls such as wildfire suppression would continue to affect sagebrush within the proposed treatment area. Sagebrush types would continue to be colonized by conifers in upper elevation timber fringe areas, and older sagebrush patches would continue to dominate the area, with little variation in seral stages and the associated understory component.

Under the action alternatives, there would be a short term adverse effect on the availability of sagebrush within prescribed burned areas, as the amount of sagebrush would be reduced. Overall vegetative species diversity (primarily forbs and grasses) and seral stages of sagebrush would be enhanced within the burn areas.

Burning would enhance the patchy pattern of differing patch types and age classes, which would be beneficial over the long term for species such as elk, deer, bighorn sheep, and Brewer's sparrow. Burning would enhance water availability in seep areas within sagebrush stands and cause a flush of new growth due to the nutrient cycling and increased soil temperature (due to the blackened burn) during the early spring. These action alternatives would contribute to a long term sustainable condition that is beneficial to most all species present.

Habitat Effectiveness, Secure Habitat, and Security Areas. Habitat effectiveness is a descriptor of the degree that quality habitat is actually available to and being used by wildlife when considering non-habitat factors such as human disturbance. Habitat effectiveness is important because it relates to the potential for displacement of wildlife from the area. It is a measure for displaying how effective an area is as habitat when comparing the amount of wildlife use influenced by human disturbance, to the amount of wildlife use without human disturbance. The degree of wildlife use of habitat in a human disturbance zone is influenced by the tolerance,

adaptability, or acclimation of wildlife species to human disturbance activities. It is possible to have high quality suitable habitat and have little or no wildlife use (minimal habitat effectiveness) due to human disturbance; in other words, wildlife have been displaced from the area due to non-habitat factors such as motorized intrusions or harassment.

Studies have shown that habitat effectiveness is dependent on several factors such as wildlife species, cover type, cover quality, topography, amount and duration of vehicle use, associated human use, presence or absence of secure habitat or adjacent security areas, and historical activity that may have allowed potential acclimation.

Secure habitat or security areas are management concepts relative to providing areas of suitable habitat (having adequate food, cover, etc. to sustain life's essential needs) located a sufficient distance away from human disturbance activities (i.e. roads, developments, timber sales, oil wells, etc.) so as to provide a sense of security or well being to the individuals within the area, such that they feel secure and are not disturbed/displaced by the human related activity. Secure habitat is an area of suitable habitat that has a high degree of habitat effectiveness, thus providing a high degree of security for individual animals.

Secure habitat areas have been defined for several larger species, but in general are areas of suitable habitat with little or no motorized use, having a quality cover component, being of meaningful size, and located a minimum distance (generally from 400 to 500 meters) from any road that receives motorized use. In the *Grizzly Bear Conservation Strategy* secure habitat for the grizzly bear is defined as an area of habitat more than 500 meters (556 yards) from an open or gated motorized access route or reoccurring low-level helicopter flight line and equal to or greater than 10 acres in size. Secure habitat can include roads restricted with permanent barriers (not gates), decommissioned or obliterated roads and/or non-motorized trails. For this habitat effectiveness/secure habitat analysis, it was assumed that disturbance/displacement for larger species occurs within 500 meters of an open road or an area having motorized use.

Any substantial human activity that intrudes or occurs within a secure habitat area has the potential to disturb and/or displace individuals within the area, thus negating its value as secure (useable) habitat during the period of the activity, and even after the activity if the activity provides new facilities (i.e. open roads) or opportunities (authorized or unauthorized) for motorized intrusions into presently secure areas where no facility or opportunity previously existed. In other words, the habitat effectiveness (security) of the area is decreased by human disturbance during the period of the activity, and even after the period of the activity until all roads within the secure habitat associated with the disturbance activity are effectively closed.

A security area is a large area of secure habitat, defined by the Forest Plan as an area of suitable habitat where displaced animals can move to in order to find security from disturbance activities. A security area must be located immediately adjacent to the influence zone of the disturbance project, where disturbance type management activities are not occurring simultaneously with the planned action, in excess of 5,000 acres in size, and having an open road density less than or equal to one mile per square mile.

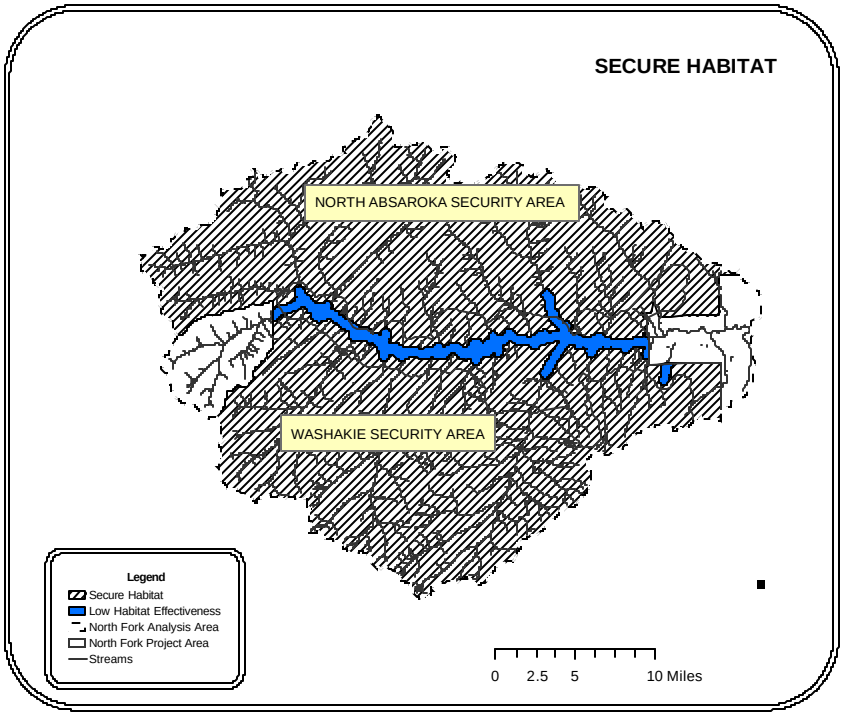
Areas free of motorized access and high levels of human use (secure habitat >10 acres or large security areas >5000 acres) are important factors influencing wildlife use of habitats and habitat effectiveness. These secure habitat parcels or large security areas that have a high degree of habitat effectiveness are especially important to females rearing young, and to all individuals during periods of high stress such as hunting season. The one point that is important in all studies relating to habitat effectiveness and secure habitat is the fact that when open roads exceed approximately one mile per square mile in forested habitat, or when cover quality decreases to a point that an animal does not feel secure, habitat effectiveness decreases at a much-accelerated rate with each additional unit of road.

Open road densities and areas of secure habitat are the major components to be considered relative to motorized use, but in some situations unauthorized use of closed roads is occurring and must be considered in the analysis. Unauthorized use of closed roads is not a major concern is this project area due primary to lack of roads and steep terrain. Human disturbance factors in this project area at present are closely correlated to the North Fork highway, the associated facilities such as campgrounds and lodges, and the related human activity.

Figure 18 displays the areas of land in the analysis area that is presently impacted by roads (areas that are within 500 meters of an open road). This area is where habitat effectiveness is well below potential, at least on a seasonal basis. Also displayed are the areas of secure habitat (>500m from an existing open road) within the large security areas (5,000+ acres) that are available in the North Fork area. Note: Secure habitat areas may be as small as 10 acres whereas security areas must be at least 5,000 acres in size.

Ninety five percent of the on-Forest area in the North Fork is presently providing secure habitat for many species with high levels of habitat effectiveness throughout the year. Habitat effectiveness values in the remaining 5% are highly variable dependent upon season. Existing habitat effectiveness values within the project area range from extremely low to high depending on the season of use. From Memorial Day weekend through hunting season in the fall, habitat effectiveness is low as there are high levels of human activity associated primarily with roaded recreation activities within ½ mile of the North Fork highway. During the winter and spring seasons, habitat effectiveness is presently higher as little human activity occurs over much of the area due to weather and snow conditions.

Figure 18. Existing large security areas of secure habitat for all wildlife species, and areas with low levels of habitat effectiveness due to open roads in the North Fork corridor.



Effects on Habitat Effectiveness, Secure Habitat, and Security Areas. The No Action alternative would maintain current levels of habitat effectiveness and the availability of secure habitat in the long term. This is because the duration and distribution of motorized use would remain the same.

Grizzly bear and large ungulates would be most impacted due to displacement caused by human disturbance associated with the roads, summer homes, lodges, etc. A low percentage of the populations would be affected during the summer season as most big game species and bears move into adjacent forests, parks, and wilderness areas.

Under the action alternatives, there would be the potential to cause displacement of larger species such as elk and grizzly in the short term within treatment areas during treatment activities (*see* Figure 19). Mitigation measures to schedule treatment activities in time and space and having adjacent large secluded security areas (>5,000 acres) of suitable habitat nearby where individuals can move to temporarily would minimize the adverse effects of displacement. The Washakie Wilderness and the North Absaroka Wilderness provide secure habitat within large security areas.

Figure 19. Acres of wildlife habitat impacted by roads (within 500 meters).

Alternative	Miles of existing road	Miles of temporary road	Acres of temporary road-caused wildlife displacement	Percent of project area	Percent of analysis area
Alternative 1	37.8	0	0	0.0%	0.0%
Alternative 2	37.8	12-12.5	828	1.19%	0.19%
Alternative 3	37.8	8-8.5	476	0.68%	0.11%

Habitat effectiveness relative to motorized use of temporary roads for treatment is highly variable depending on the species of concern and the season of operations. Habitat effectiveness relative to bears would be unchanged during the 12/1-3/31-winter period as bears would be denned, and during the critical spring period 4/1-7/1 as no operations would be allowed. Habitat effectiveness relative to big-game species would decrease on roaded winter range areas occupied during the winter period. During the summer and fall periods (July 1 to November 30), habitat effectiveness would be low for all species within 500 meters of roads due to motorized activity associated with mechanized treatments. This is the period when the number of individuals in populations would be minimally affected as most are dispersed throughout the analysis area and adjacent lands.

Habitat effectiveness relative to use of helicopters for prescribed burning would decrease substantially in treatment areas during treatment; effects would be very short term (several days) due to the limited time required for burning.

The effects of Alternative 2 would have the greatest effects on habitat effectiveness when compared to Alternatives 3, as it would treat more acres and require more temporary roads.

An in-depth discussion of secure habitat and the secure habitat standard as contained in the *Grizzly Bear Conservation Strategy* can be found in the following section on grizzly bear.

3.2.2 Threatened and Endangered Species

The Endangered Species Act requires evaluation of potential effects of actions on proposed and listed species and designated and proposed critical habitat, and a determination as to the effects of the action. The US Fish and Wildlife Service has identified three threatened species, and one experimental population that is to be managed the same as a proposed species, which may possibly occur in the North Fork area of the Shoshone National Forest (Letter dated 3/3/03). No proposed or critical habitat for any of these species has been designated on the Forest.

All endangered and threatened species known to occur on or near the Shoshone National Forest were considered in this analysis as part of complying with the Endangered Species Act. Effects analysis was completed for any species that occur or could possibly occur in the analysis area. To determine which species could occur within the analysis area, species occurrence records for the area were checked, and the habitat requirements of the species were compared with the habitat

present in the analysis area. Any species determined unlikely to occur in the analysis area was not carried into further analysis and given a no effect determination. A Biological Assessment (BA) of effects to threatened and endangered species is in the project file. This document contains a summary of the relevant portions of the BA.

The Wyoming Natural Diversity Program Data Base (Scholl et al. 2000), Shoshone National Forest Sensitive Species Survey reports, the draft Wyoming Bird Conservation Plan, Grizzly Bear Cumulative Effects Model data base, IGBC Annual Reports and flight location data, Yellowstone Wolf Project Annual Reports and flight location data, Wyoming Game & Fish Department personnel, USFWS personnel, and other sources were consulted for endangered and threatened species locations within the analysis area.

Gray Wolf

The gray wolf is formally listed under ESA as threatened, and is also a Forest Plan Management Indicator Species selected because it was a listed species. It was reclassified as non-essential, experimental in the Yellowstone area with the publication of the Final Rule in the Federal Register (November 22, 1994; Vol. 59, No. 244). The species was reintroduced in the Yellowstone National Park area in 1995, and as a non-essential experimental population is managed as a proposed species. This designation provides greater flexibility in the management of wolves and allows greater accommodation in land use activities.

The gray wolf is known to use the Forest and, as of 2004, at least six packs[13] were documented as using the Shoshone National Forest as a major portion of their home range; several other packs occasionally use the Forest. Average litter size in Wyoming in 2003 was 4.1 and average pack size was 9.1 wolves (USDI 2004).The wolf population appears to be healthy, expanding in both numbers and distribution, and actions to delist the species in the Yellowstone Ecosystem are progressing.

The availability of a stable ungulate prey base is the primary habitat requirement for this species, although smaller animals and carrion also provide a food source. Wolves are dependent on big-game populations, and generally occur in or near ungulate migration, wintering, parturition, and young rearing areas. Large herds of available prey do exist in the project area and analysis area making the total area excellent habitat. The total analysis is potential habitat for the wolf, as is most all areas of the Forest. Wolves have been reported in most drainages of the North Fork including portions of the treatment areas.

The major threats to this species are human caused mortality that results from conflicts with domestic pets and livestock, as well as malicious killing by anti-wolf advocates.

Effects on Gray Wolf. Effects of any action on wolves are dependent primarily on the effects to its prey species. There would be little change in prey species abundance or distribution with any of the alternatives. The action alternatives would likely temporarily displace the wolf and its major prey from small areas during treatment activity, but would be beneficial to the wolf in the long term due to enhancement of conditions for deer and elk, the major prey species. The occasional presence of wolves in the analysis area is not expected to change as a result of this project.

Cumulative Effects

The gray wolf is somewhat impacted by both natural and human-caused disturbances, but the greatest impacts are caused by changes to prey species populations. Cumulative effects of the action alternatives relative to elk, the primary prey species, are discussed in the MIS section of cumulative effects *(see* section 3.10).

Determination of Effects and Rationale for the Determination

After reviewing the current status of the wolf, the environmental baseline for the analysis area, the effects of the action alternatives, and the cumulative effects; it is the determination that either

[13] Absaroka, Sunlight, Beartooth, Carter Mountain, Washakie, and Greybull, packs

of the action alternatives, when considered under Section 7 of the ESA, "is not likely to jeopardize the continued existence or modify proposed critical habitat of the wolf." No critical habitat has been designated for the wolf therefore none would be affected. It is also the conclusion relative to the effects of the action alternatives on this MIS that these alternatives may adversely impact individual wolves, however neither of the action alternatives relating to this project are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

The reasoning for this determination and conclusion is because wolf population growth rates exceed the required level and, in addition, this action would not adversely affect the natural prey base of the species. With the introduction of wolves to Yellowstone National Park, all wolves in Wyoming, including any that may have been present prior to the introduction, are now classified as non-essential, experimental. Because it is an experimental population, and as six breeding pairs have been established and wolf population growth rates have remained positive toward population recovery levels, no land use restrictions are required on National Forest lands (50 CFR Part 17.84(xii)(4)).

Bald Eagle

The bald eagle is a threatened species listed under ESA, and is also a Forest Plan Management Indicator Species selected because of its listed status. On July 6, 1999, the proposed rule to remove the bald eagle in the lower 48 states from the list of threatened wildlife was published in the Federal Register (FR, Volume 64, No. 128). To date no final action has been taken on the proposal to delist the bald eagle. Since 1983, the Greater Yellowstone Bald Eagle Working Group (GYBEWG) has guided management of bald eagles in the GYE. Until recently, this group met once or twice annually to foster interagency communication and direction and identify, implement, and track necessary research, plans, and projects related to bald eagle ecology. During the last two to three years, little work has been accomplished by the GYBEWG, largely because of the eagle's improved status and the decreasing need for the same level of management focus.

The bald eagle is primarily an uncommon winter resident on the Forest with small numbers of birds being observed, mostly along major stream courses throughout the Forest including the North Fork Shoshone River. Although numbers are limited, the wintering population trend over the past several decades on the Forest and in the North Fork has been stable to slightly upward.

Individuals or small groups of two or three birds have been recorded in various habitats on the Forest during migration periods. No active nests have been known to exist on the Forest within the last five years. Potential suitable habitat exists in several locations on the Forest although none is classified as a "key area" in the *Pacific Bald Eagle Recovery Plan* (U.S. Fish and Wildlife Service 1986). Similarly, suitable habitat is not highlighted in *A Bald Eagle Management Plan for the Greater Yellowstone Ecosystem* (Greater Yellowstone Ecosystem Bald Eagle Working Team 1983). Large nesting trees in open water areas near large lakes and rivers that are relatively undisturbed by human activity appears to be the major limiting factor on-forest including the analysis area. Such areas are not generally available on the forest (Forest Monitoring Report 2002).

Effects on Bald Eagle. As there are no known nest sites presently in the North Fork, disturbance during the nesting and young-rearing periods are not a concern. As wintering eagles may use portions of the analysis area incidentally for foraging during the winter period, temporary displacement from roosting, perching, and foraging areas has the potential to occur with the action alternatives. As no specific or preferred roosting or perching sites are known, and as large amounts of trees of suitable structures exist throughout the river corridor, and as eagle use is primarily limited to occasional foraging, fuel reduction activities would have negligible direct effects on bald eagles or their habitat.

In eagle wintering areas, long term effects to habitat are negligible with any alternative. Most potential roost or perch tree sights would not be treated, many additional dead roost or perch trees are being recruited along the river riparian areas, and potential effects on forage areas and food sources are discountable.

Cumulative Effects

Of the factors discussed above, bald eagles are most impacted by disturbance during nesting. As eagles have reached a recovered population level in the Greater Yellowstone Area (GYA), and as no nesting sites are known in the analysis area, the incremental or cumulative impact of this single action when added to all other past, present, and reasonably foreseeable actions in all jurisdictions has little measurable influence on the status of the eagle over the long term.

Determination of Effects and Rationale for the Determination

After reviewing the current status of the bald eagle, the environmental baseline for the analysis area, the effects of the action alternatives, and the cumulative effects; it is the determination that either of the action alternatives, when considered under Section 7 of the ESA, "may effect, but is not likely to adversely affect" the bald eagle. No critical habitat has been designated for the bald eagle therefore none would be affected. It is also the conclusion relative to the effects of the action alternatives on this MIS that these alternatives may adversely impact individual bald eagles, however neither of the action alternatives are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

The reasoning for this determination and conclusion is because there are no active bald eagle nests or key areas within the analysis area, either on or off Forest. Fuels treatment in this area does not appear to pose a threat to bald eagles. Fuels treatment on-Forest most likely does not contribute in a measurable manner, either beneficially or adversely, to cumulative effects caused by non-federal actions on bald eagles or their habitat. Should new nests be discovered within the analysis area during the period of operations, application of the standard management measures and conditions for eagle nesting habitat in appropriate areas around the nests would preclude any adverse effects.

Grizzly Bear

The grizzly bear, a threatened species listed under ESA and a Forest Management Indicator Species (MIS), occurs in the analysis area. It was selected as a MIS due to its listed status. It was also identified during scoping as a species of concern regarding this proposal. The grizzly is relatively abundant within the analysis area as well as the northern portion of the forest. Habitat appears to be available forestwide. The analysis area includes portions of the recovery zone, and the total analysis area is occupied habitat. The upper portions of the analysis area are included within the Shoshone Bear Management Unit (BMU) that is part of the recovery zone. The Shoshone BMU comprises approximately 30% of the recovery area on the Forest, covers 373,760 acres, and encompasses four BMU subunits(*see* Figures 20). A viable population exists within the ecosystem, with a population estimate of over 500 bears (Conservation Strategy 2003). The grizzly population within the Shoshone BMU appears to be at or approaching saturation density.

Mortality, recruitment, distribution, and population trends of the grizzly bear population are closely monitored. To date, all parameters indicate that the population trend is upward on the North Fork area, as well as forestwide and within the ecosystem over the past several decades. The most current information indicates that the population of bears in the Yellowstone ecosystem is growing at approximately 3 to 4% annually, and that distribution has also increased (Conservation Strategy 2003).

The major threats to the grizzly bear in the North Fork area are loss of habitat due to roading and development on private land, human-caused mortality resulting from human/bear conflicts (primarily on private lands), and permanent displacement of individuals as a result of increased human activity throughout the area. Existing direction for management of National Forest System

lands does not allow new permanent roads or new developments, thus habitat value and habitat availability on-forest is expected to remain relatively static. In addition, the majority of future conflicts are expected on developed areas of private lands because these areas were previously suited bear habitat, and because there are no bear protection mechanisms such as attractant storage in place.

It appears that "management of roads is the most powerful tool available to balance the needs of bears and all other wildlife with the activities of humans" (Appendix B, Grizzly Bear Recovery Plan 1993). One of the most important concerns in the conservation of the grizzly bear is to minimize opportunities for habituation of bears and associated grizzly bear/human conflicts.

To adequately address these concerns, conservation measures and recommendations contained in the *Interagency Grizzly Bear Guidelines*, *Grizzly Bear Recovery Plan*, the *Shoshone National Forest Plan*, *The Final Conservation Strategy for the Grizzly Bear In the Yellowstone Area* [14], closure orders, biological opinions, and other applicable documents have been incorporated into the design of this project. The project design features as displayed in Chapter 2 are intended to provide a comprehensive and integrated approach to the goal of grizzly bear conservation. The project is designed to minimize adverse effects from roads, to enhance habitat values where opportunities exist and enhancement is desirable, and minimize grizzly bear/human conflicts, thus reducing the overall incidence of grizzly bear adverse effects.

Habitat and Distribution In the Analysis Area. The majority of the North Fork area on National Forest is within the recovery zone and bears use most all portions of the North Fork area during some portion of the year. The analysis area is occupied by relatively high numbers of grizzly bears during all seasons, with habitat values generally being in the low to moderate range (Conservation Strategy 2003). Based on the existing data, it appears that bear use of the project area is frequent dependent on season, and seasonal habitat values are generally low to moderate (Conservation Strategy 2003).

It also appears that due to availability of preferred vegetation forage species (i.e. clover) and carrion, small select areas have high habitat value during short periods during spring and fall.

Grizzlies spend much of their time searching for energy-rich foods and the search for food strongly influences bear movements. Diverse structural stages of vegetation that support many plant species and animals are needed to meet the energy demands of the grizzly. Bears consume animal matter, roots, bulbs, tubers, fungi and tree cambium, berries, seeds, and fish (Craighead *et* 1995). Snow cover severely limits foraging areas and food sources during the spring and early summer period when protein rich foods are most needed by bears emerging from dens in order to put on weight and for lactating females with cubs.

Succulent vegetation within the riparian bottoms, carrion, and elk calves provide the major protein sources for bears in the analysis area during spring and early summer. Bears concentrate in the bottomland areas along the North Fork corridor especially during this spring/early summer period when snow limits their range, the bottoms are greening up, and large amounts of carrion and newborn ungulates are available.

They also frequent the bottomland riparian areas during the fall when upland foraging areas dry out. During the fall bears key in on crippled big game animals, gut piles, berries, and succulent vegetation. Some bear activity also occurs in the corridor during the summer months, but most individuals disperse into the higher elevations and use a wide variety of foraging areas including

[14] The Final Conservation Strategy for the Grizzly Bear in the Yellowstone Area has been completed. The strategy does not go into effect until the Grizzly Bear is delisted and it is published in the Federal Register. The strategy includes some of the most recent scientific information on management and monitoring of the grizzly bear. This information was used as part of the project design. The habitat standard related to access management and secure habitat incorporated within this analysis is consistent with the Final Conservation Strategy.

moth aggregation sites. There are known moth aggregation sites at higher elevations on both sides adjacent to the corridor, but well outside of the areas planned for treatment.

Identified big game crucial ranges (winter and birthing) that provide concentrations of carrion and live big game animals that bears use, cover a portion of the project area as shown in Figure 21. Approximately two thirds of National Forest System lands within the analysis area have the potential for providing these crucial range protein sources for grizzly bears.

Denning (*see* Figure 22) occurs in the area at locations having characteristics preferred for denning, generally on steep timbered north slopes above 7,800' in elevation (Craighead and Craighead 1970). Denning habitat as described by Haroldson et al 2002, and Judd et al. 1986, is associated with moderate tree cover, on 30-60% slopes, and northerly exposures were most common. Grizzly bears in the GYA can den from the end of September to the last week in April or early May, with entrance and emergence dates being affected by the gender and reproductive status of the bears (Haroldson et al. 2002, Judd et al. 1986 as contained in the review copy of the DEIS for the Conservation Strategy).

- Den entry for females began during the fourth week in September, with 90% denned by the fourth week of November.
- Earliest den entry for males occurred during the second week of October, with 90% denned by the second week of December.
- Male bears emerged from dens earlier than females. The earliest den emergence for males occurred during the first week of February, with 90% of males out of dens by the fourth week of April.
- Earliest den emergence for females occurred during the third week of March; by the first week of May 90% of females had emerged. Known pregnant females tended to den at higher elevations and, following emergence, remained ate higher elevations until late May. Females with cubs remained relatively close (<3 km) to den sites until the last two weeks in May.

There are no known den sites in the areas being planned for treatment, and den occurrence in treatment areas is unlikely because of the above parameters.

Figure 20. Grizzly bear recovery zone (also called Primary Conservation Area (PCA)), Shoshone Bear Management Unit (BMU), and BMU subunits.

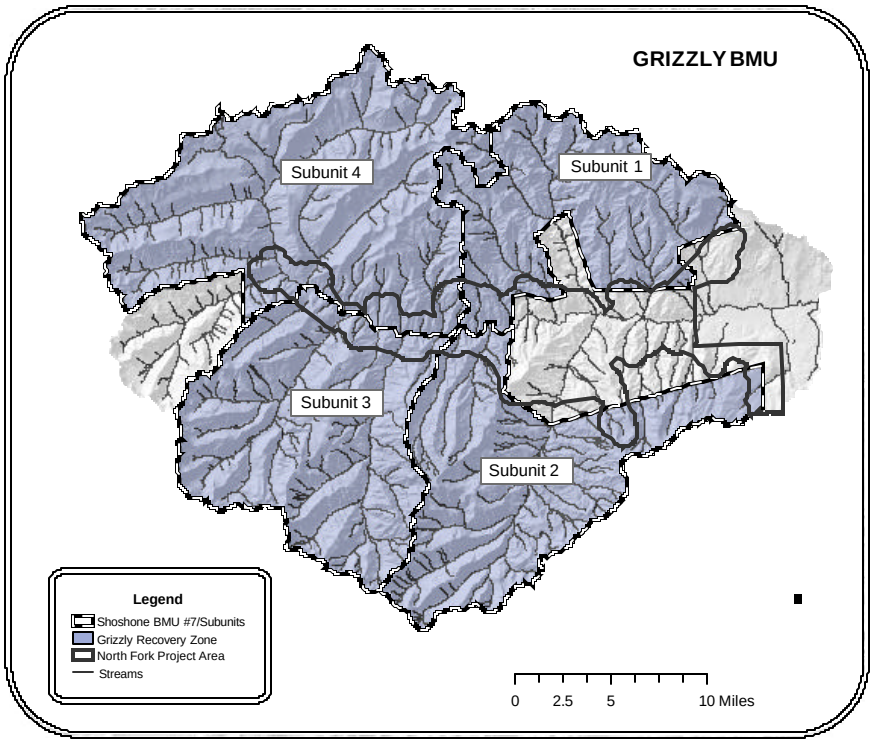


Figure 21. Crucial big game wintering and birthing areas, and migration routes.

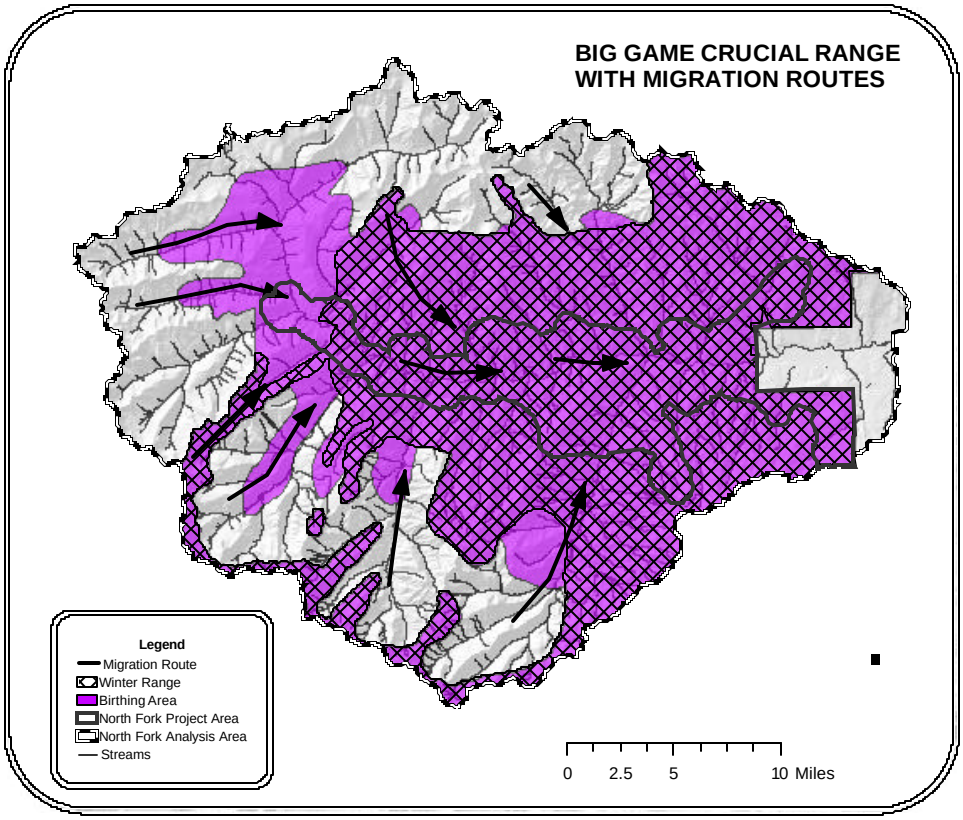
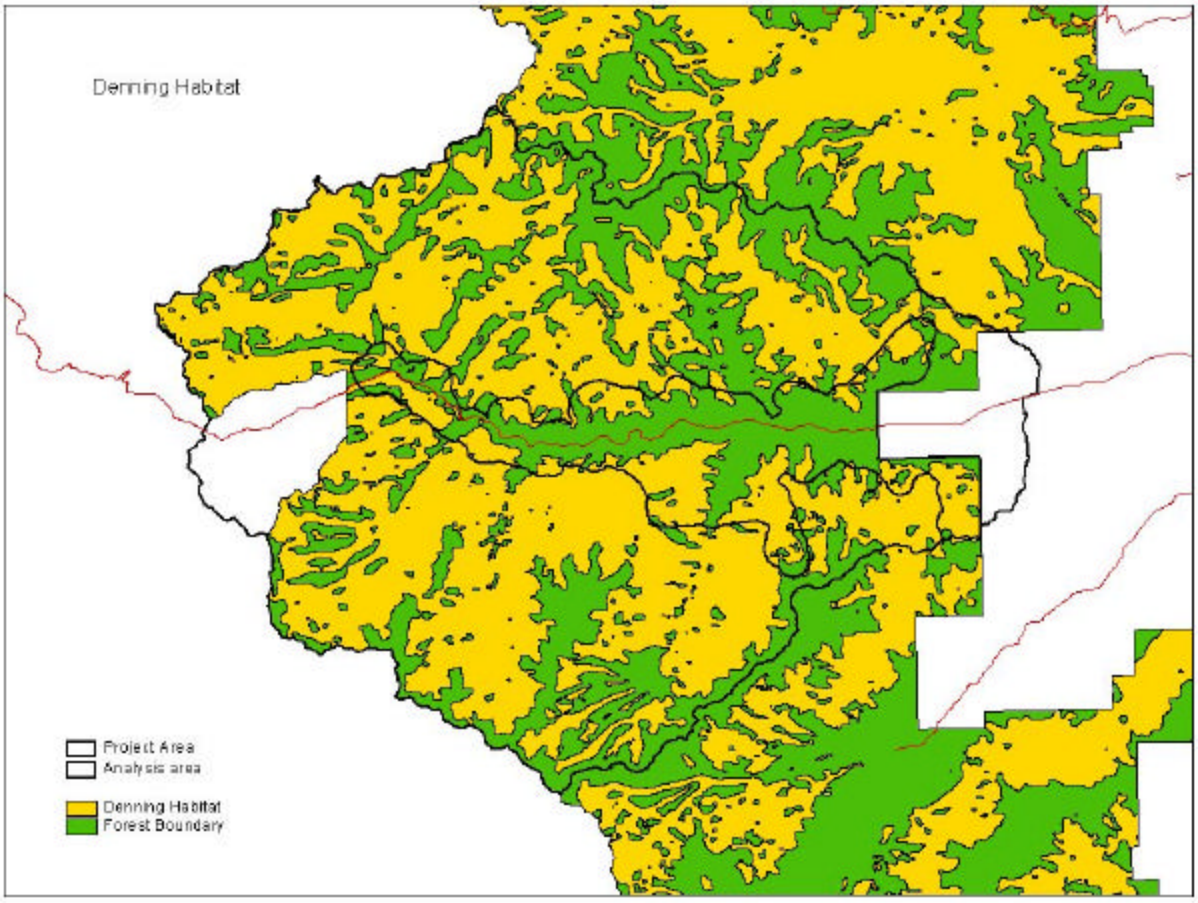


Figure 22. Potential grizzly denning habitat.



The post-emergence period is a very critical period for bears, especially for females with cubs, because habitat is restricted to lower slopes and valley bottoms due to snow cover, limitation of food sources, and lack of green-up of higher elevation forage areas. During high snow or cold wet springs, bears are many times restricted to these very limited habitats until early July as evidenced by the number of bear jams in the North Fork corridor when those conditions exist.

Secure Habitat. Studies of the effects of open roads on grizzly bears generally have shown that bears are displaced by vehicular use and that whether the roadway is a primary, secondary, or tertiary road has little to do with the displacement (Zager 1980, McLellan and Shackelton 1988). Substantially less use of habitat within 250 meters of a roadway occurs. McLellan and Shackelton (1988) in a seven-year study of 27 collared bears, concluded that when roadways are developed in grizzly bear habitat, bear populations become highly vulnerable unless vehicle access and people with firearms are controlled.

Bears may use roadways and adjacent areas under cover of night but avoid them during daytime. More recent research in Montana (Mace and Manley 1993, Mace et. al. 1996) noted that in addition to open road density, total motorized access route density and secure areas (areas free of motorized access and high levels of non motorized use) are important factors influencing grizzly bear use of habitats. These secure areas are especially important to females for rearing cubs.

Human disturbance factors in the North Fork area at present are closely correlated to open road access relative to the North Fork highway, the associated developments, and the related human

activity. There is little unauthorized use off-road or on closed roads as there is little opportunity for such use due to the absence of many closed roads and steep terrain.

Secure habitat as defined in the *Conservation Strategy* is more than 500 meters from any open or gated motorized access route or reoccurring low-level helicopter flight line, and more than 10 acres in size. The existing acreage of secure habitat within the Shoshone BMU is presently above the 1998 base level (373,760 acres) of secure habitat due to road closures and decommissioning that has occurred since 1998. Due to the large amount of Wilderness and non-roaded areas, 97% of the recovery zone in the Shoshone BMU is presently providing secure habitat (*Final Conservation Strategy*), and 83% of the on-Forest area outside the recovery zone is presently providing secure habitat for bears and other species.

Secure habitat for grizzly (*see* Figure 18) occurs in most areas outside the highway corridor, both within the recovery zone and outside the recovery zone. Large security areas of secure habitat areas exist on both sides of the North Fork corridor as roads and development is limited to the narrow corridor along the highway. The Washakie Wilderness and non-roaded areas to the south as well as the North Absaroka Wilderness and non-roaded areas to the north presently provide large security areas of secure habitat for bears.

Effects on Grizzly Bear. The No Action alternative would have no major change in habitat value in the short term as natural processes and disturbances influenced only by existing management activities and controls such as recreation, fuelwood gathering, or wildfire suppression would continue to affect habitat value within the proposed treatment area. Habitat value in the long term would be determined solely by natural disturbance factors, and as succession is being set back, foraging value would be enhanced.

The short term adverse effect of the action alternatives on grizzly bears is the potential for incidental disturbance and temporary displacement of individual bears from preferred bear habitat as a result of human activities associated with treatment activities. Any displacement would likely be short term, and seasonal rather than year-round.

Temporary displacement from mechanical treatment and slash disposal is expected to be minimal, as a substantial amount of activity would occur during the winter period when bears are denned. Temporary displacement resulting from prescribed burning is strictly short term, as treatment in any one treatment unit would be completed within two to three days. Measures relative to scheduling treatment activities in time and space and having adjacent large security areas (>5,000 acres) nearby can minimize the adverse effects of temporary displacement. The presence of the security areas and secure habitat on both sides of the North Fork corridor in the Wilderness areas and RARE II areas provides any displaced bears undisturbed security areas to move into.

There would likely be no impacts to denning bears, as no den sites are known to exist in the treatment areas, den sites are not generally located in areas suitable for timber harvest by conventional methods, and prescribed fire treatment areas are not as a general rule prescribed in the types of habitat preferred for denning. There would be no impacts to bears using moth aggregation sites as the sites are located far outside the treatment areas and this action would have no measurable effect on individual bears traveling to and from these areas.

The likelihood of a bear being struck by logging or burning related traffic is extremely unlikely and is thus a discountable effect. There is the potential for human/bear conflicts relative to attractants and direct encounter. Due to food storage requirements, close regulation of logging camps, and education of all workers, the likelihood of such conflicts is minimal and the potential adverse effects to individual bears related to such encounters are negligible.

There are no measurable long term indirect effects on individual bears from the action alternatives relative to behavior, movement patterns, or reproductive potential. No permanent displacement is expected.

Under the action alternatives, vegetative cover would be reduced a small amount by timber harvest and burning in the short term. However, the majority of cover provided by the older age classes of trees has already been reduced to some degree by the insect caused mortality, and the density of younger age-class trees would not be reduced except in select areas around developments, for meadow enhancement, and in areas where major breaks in fuel continuity is planned. Changes in the distribution, quantity, and quality of cover are not necessarily detrimental to grizzly bears (Blanchard and Knight 1996).

In the long term, habitat foraging value for grizzly bears would be enhanced by the planned action as the understory forb and shrub types that provide food sources would be increased due to the overstory canopy being reduced with timber harvest and burning. Reversion of vegetation, especially in wetland and riparian areas, to an earlier seral stage would favor species of succulent vegetation and some berry producing species. Habitat foraging value for grizzly bears would be enhanced by any of the alternatives as the understory forb and shrub types that provide food sources would be increased due to the overstory canopy being reduced, either by natural thinning by insects or in conjunction with timber harvest and burning.

The only exception to this forage enhancement, and of major concern is the potential loss of whitebark pine to blister rust and mountain pine beetle. Although whitebark pine is an early succession species, it is an essential component of quality bear habitat, and loss of many mature stands could have major effects to bear populations over the long term. The majority of whitebark stands in the analysis are in a mature seral state and highly vulnerable to insect and disease infestation, the same as with the other tree species in the area..The action alternatives would not be treating any whitebark pine stands, and would not contribute in any manner, either adversely or beneficially, to the naturally occurring change presently affecting whitebark pine stands due to insect and disease.

Also of concern are the potential effects on moth aggregation sites. The nearest identified moth aggregation sites are over three miles from the treatment areas. They would not be impacted by any of the alternatives as increased human activity in proximity to the moth sites is not occurring as an result of this project.

Alternative 2 would enhance foraging value the most when compared to other alternatives, as vegetation treatment, especially in wetland, riparian areas, and higher quality sites to an earlier seral stage would favor species of succulent vegetation and some berry producing species.

Alternative 3 would enhance habitat value also, but to a lesser degree than Alternative 2 as less area would be treated.

Effects on Secure Habitat. With the No Action alternative the amount of secure habitat available to the grizzly bear within the recovery zone as per the Conservation Strategy Secure Habitat Standard, would remain at the present level of 97% of the recovery zone.

In Alternative 2, the proposed action, 778 acres of secure habitat within the recovery zone (or primary conservation area) would be temporarily impacted by new temporary road construction considering the 500-meter buffer. The allowable acreage of secure habitat that could be impacted by new roads at one time based on the Conservation Strategy secure habitat standard of 1% of the acreage in the largest subunit is 1210 acres. This alternative is within the constraints set by the Conservation Strategy.

In Alternative 3,426 acres of secure habitat within the recovery zone would be impacted. Again, this is well within the constraints of the Conservation Strategy secure habitat standard. Although

habitat outside the recovery area is not addressed in the Conservation Strategy, only a few acres of secure habitat outside the recovery area relative to roads would be temporarily affected.

Cumulative Effects on Grizzly Bears and Their Habitat

Of the factors discussed above, grizzly bears are most impacted by disturbance and reduced habitat effectiveness. Bears have reached a recovered population level, and currently use the on-Forest portion of the North Fork area extensively. Based upon this trend toward recovery, past and current activities on the Forest have contributed beneficially to the bear.

The incremental effects of the action alternatives would be beneficial when considering the status of bears in all ownerships. There would be no increase in open roads on-Forest, secure areas would be maintained on-Forest, and earlier seral habitat would enhance foraging habitat for the bear. The incremental or cumulative impact of this single action when added to all other past, present, and reasonably foreseeable actions in all jurisdictions has little measurable influence on the threats to the bear over the long term. Although this single action makes a small beneficial contribution toward conservation of species when considering cumulative effects, this action cannot offset or compensate for past, present, and reasonably foreseeable adverse cumulative effects caused by non-federal actions or actions on non-federal lands. Additional discussion of cumulative effects are included in Section 3.10.

Determination of Effects and Rationale for the Determination

During the period of operations, short term direct effects are expected to be adverse on some individuals, but most would most likely be insignificant (immeasurable), or discountable (extremely unlikely) as summarized below:

- Temporary displacement from mechanical treatment and slash disposal is expected to be minimal, as a substantial portion of the activity would occur during the winter period when bears are denned.
- Temporary displacement resulting from prescribed burning is strictly short term, as treatment in any one treatment unit would be completed within 2-3 days.
- No permanent displacement is expected.
- No measurable effects are expected on productivity and recruitment of grizzly.
- No measurable acclimation of bears to human food is expected as a result of this action.
- No mortality of bears is expected from this action, either management control actions or illegal taking.

The long term indirect effects of this action are expected to be beneficial from a habitat value perspective, and secure habitat and habitat effectiveness values would be maintained as no new motorized access routes are being provided. By providing more optimum habitat conditions on this project area in the future (away from developments), and due to conscious design to move toward maintenance of quality habitat conditions for the grizzly, this area could contribute to an increase in productivity and recruitment if future projects also contribute to such favorable conditions across the landscape.

After reviewing the current status of the grizzly bear, the environmental baseline for the analysis area, the effects of the action alternatives, and the cumulative effects; it is the determination that either of the action alternatives, when considered under Section 7 of the ESA, "may effect, but are not likely to adversely affect" the grizzly bear. No critical habitat has been designated for the grizzly therefore none would be affected. It is also the conclusion relative to the effects of the action alternatives on this MIS that these alternatives may adversely impact individual grizzly bears, however neither of the action alternatives are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

The reasoning for this determination and conclusion is because the PDFs described in chapter 2 were integrated into the design of this proposal in order to achieve the enhancement intent of Section (a)(1) of the Endangered Species Act. This section of the Act requires "affirmative

conservation" programs be implemented, which implies that enhancement actions be taken when appropriate and when opportunities exist. Long-term enhancement, and short-term retention of essential habitat conditions that are favorable and sustainable to the grizzly bear were major considerations in the design of this proposal. Although short-term displacement of individuals could occur, a sufficient amount of secure habitat and the presence of large security areas are available for the bear. All road construction associated with the project involves temporary roads that will be decommissioned immediately after use; no harvest will occur during the critical spring period; scheduling, timing, and duration of activities consider the needs of the bear; and intrusion into secure habitat areas would be minimal.

Canada Lynx

The following discussion relating to the needs of the lynx, the potentially affected habitat, and potential effects to lynx or lynx habitat is limited to the factors that are relevant to this decision. An in-depth discussion of the status, population dynamics, and life history of the lynx can be found in the sources referenced in this section.

The Canada lynx is a listed threatened species and a species of concern relative to this proposal. Critical habitat has not been designated for this species. This discussion is based on review of the following primary sources of literature, as well as personal experience and observation: Ruediger 2000 (LCAS), Ruggiero *et al.* 2000 (Ecology and Conservation of Lynx in the United States), Ruggiero *et al.* 1994 (Scientific Basis for Conserving Forest Carnivores), USFWS 2000 (Final Rule), USFWS 2003 (Clarification of Final Rule), Clark 1987 (Mammals of Wyoming), sensitive species survey information collected from 1995 to present, existing Biological Opinions, and Forest monitoring reports.

The Forest Service is currently working under the Canada Lynx Conservation Agreement (LCA), which states on page 7 that "the Forest Service agrees to review and consider recommendations in the LCAS (2nd edition of the Lynx Conservation Assessment and Strategy) prior to making any new decision to undertake actions in lynx habitat." The LCAS contains objectives, conservation measures, standards, and guidelines specific to potential lynx habitat (pages 7-4 to 7-17). These action alternatives were planned to provide for the conservation of the lynx while maintaining consistency with the LCAS to the degree possible.

As quality wintering habitat for snowshoe hare appears to be the primary habitat-limiting factor for lynx, all objectives relative to vegetative management activities and practices stress, either directly or indirectly, the maintenance/improvement of habitat characteristics for winter snowshoe hare habitat. Retention or enhancement of the primary prey base is critical relative to conservation of the lynx.

The following is a summary of the standards relating to vegetative management contained within the LCAS that are relevant to this action and that should be considered within a Lynx Analysis Unit prior to a vegetative treatment action being initiated:

- If more than 30% of lynx habitat (primary forested habitat) within an LAU is in unsuitable condition (where a forest stand is in the stand initiation structural stage where trees less than 30 years and do not protrude above the snow), no additional habitat may be made unsuitable by vegetation management projects.
- Timber management projects shall not change more than 15% of lynx habitat (primary forested habitat) within an LAU to an unsuitable condition in a 10-year period.
- Maintain at least 10% of the lynx habitat (primary forested habitat) as denning habitat in patches generally larger than 5 acres.
- Salvage harvest following disturbance within lynx habitat (primary forested vegetation) is limited to areas where more than five acres was disturbed.

Status of Lynx in the Analysis Area. There is no data in the historical record to indicate that there has ever been a healthy, self-sustaining viable population of lynx on the Shoshone National

Forest. Only a limited number of reports of sightings or trappings of individual animals are documented over the past century. There are no documented sightings or reports of lynx in the North Fork area during recent times; however, lynx have been documented within the past few years on the Clarks Fork District to the north and in the eastern portions of Yellowstone National Park to the west.

There is little doubt that the habitat-limiting factor for lynx on the Forest is the absence of quality snowshoe hare habitat. Based upon review of old photos (1800's) it is likely that historical conditions were much more favorable for lynx as much of the forested area was in earlier succession due to natural fire disturbance, thus benefiting hares. The majority of forested area is presently older mature stands that do not contain adequate structure for hares.

Habitat. Primary (forested) lynx habitat in the western mountains is in boreal forest with primary vegetation consisting of lodgepole pine, subalpine fir, and Engelmann spruce (Aubry et al. 2000 cited in LCAS). Other forested and nonforested vegetation types (shrubland and grassland) adjacent to and intermixed with primary forested lynx habitat (secondary habitat) supporting alternate prey species are also used for foraging. Dry forest types do not provide quality lynx habitat (LCAS). Within these general forest types, lynx are most likely to persist in areas that receive deep snow, to which the lynx is highly adapted (Ruggiero et al. 2000).

Lynx tend to avoid large open areas and appear to prefer cover having a high-density canopy (Ruggiero et. al. 1994). It is important to note that a high-density canopy is not limited to mature and old growth conifer stands, but also occurs in earlier seral stands. When sagebrush communities are in proximity to primary coniferous and conifer/aspen habitats, they may also provide important alternate prey resources for lynx (LCAS).

Quaking aspen *(Populus tremuloides)* stands and forest edges, as well as open grass meadows and forest ecotones, may also support relatively high numbers of snowshoe hares and Canada lynx. On a landscape scale, Canada lynx habitat includes a mosaic of early seral stages that support snowshoe hare populations and late seral stages of dense old growth forest that provide ideal denning and security habitat. Connectivity between Canada lynx populations is critical.

Western boreal forests are prone to major disturbances of wildfire and insect infestation (Agee, 2000 cited in LCAS), and it is thus implied that lynx habitat is closely associated to those natural disturbance regimes and the related vegetation succession process. Most fires are small. Larger fire patches; however, affect most of the landscape, with unburned areas inside the fire perimeter (stringers, islands, fire skips) (Ruggiero *et al.* 2000). Fire return intervals in western boreal forests range from 150-300 years, and fires are generally stand replacement events (Agee, 2000 cited in LCAS). The return interval for spruce beetle appears to be a little over 100 years, and once a local outbreak exceeds a certain size, it can become self-propagating and spread much like wildfire but more slowly (Holling 1992 cited in LCAS). This typifies the vegetation and disturbance factors presently in the analysis area.

Fire severity tends to be high in most of the forest types where lynx habitat occurs (Agee, 2000 cited in LCAS). These natural disturbance events as well as timber harvest (and prescribed fire) can provide for quality lynx foraging habitat. Remnant patches or stringers of old growth generally remain within large burn areas, and the presence of these patches are likely critical for lynx denning habitat (LCAS). Selection of mature stands within a burned forest matrix has been demonstrated, and it is strongly implied that lynx hunt along the edges of this habitat, and some use of terrestrial openings is common (Murry *et al.* 1994, Fortin and Huot 1995; Poole *et al.* 1996 cited in LCAS).

The ability of naturally dynamic habitat to support a lynx population changes as the habitat undergoes natural succession following natural or human-caused disturbances (i.e. wildfire, insect

infestation, or timber harvest). Optimum habitat appears to be linked to disturbance regimes and consists of a landscape matrix of various age classes and vegetation types. This can be accomplished by frequent and numerous but relatively small natural or human disturbances or large patchy disturbances which leave abundant remnant patches of mature trees (LCAS).

At the stand level, lynx prefer regenerating forest stands like those of it main prey, the snowshoe hare (Thompson 1988; Koehler and Aubry 1994 cited in LCAS). Lynx demonstrate a strong selection for mature stands included within a mid-seral burn, but they demonstrate strong selection against mature forest when it is the matrix habitat (Kesterson 1988 and Staples 1995 cited in LCAS). Mature forest is the matrix habitat in the analysis area.

Within 10 to 30 years following disturbance, lynx begin to forage for hares in vegetation that provides a high density of young conifers that protrude above the snow (Sullivan and Sullivan 1988 cited in LCAS). The abundance of snowshoe hares to provide an adequate winter food source appears to the habitat-limiting factor relative to occupancy by lynx although squirrels, grouse, marten, and voles are common in the diet during population lows.

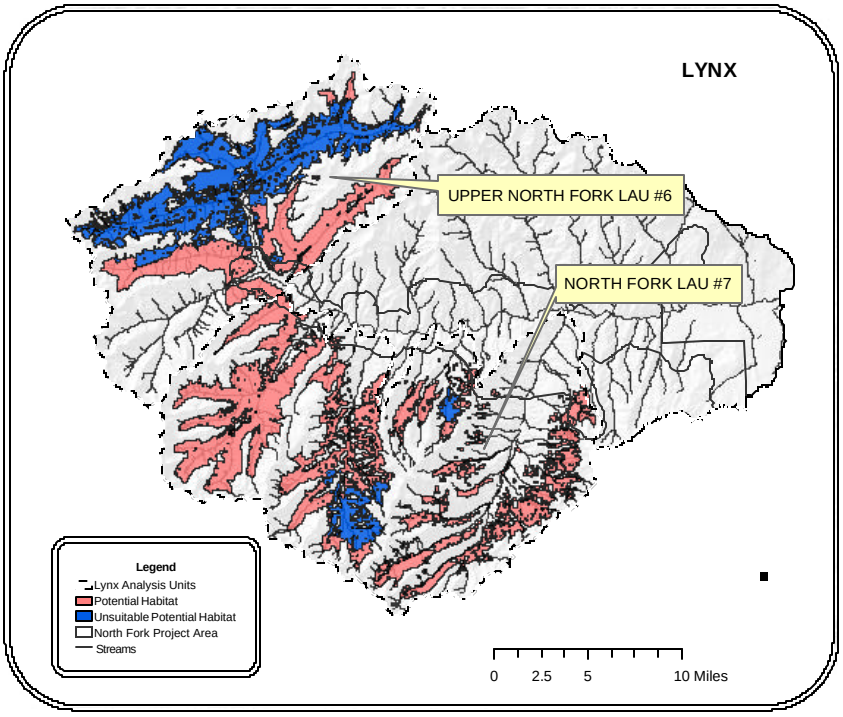
Den site selection. Lynx use large woody debris, such as downed logs, root wads and windfalls, to provide denning sites with security and thermal cover for kittens (McCord and Cardoza 1982; Koehler 1990; Koehler and Brittell 1990; Mowat et al. 2000; Squires and Laurion 2000, cited in LCAS). For the first few months of life, kittens are left alone at these sites when the female lynx hunts. Downed logs and overhead cover provide protection of kittens from predators such as owls, hawks and other carnivores.

The age of the forest does not seem as important for denning habitat as does the amount of downed, woody debris available (Mowat *et al.* 2000 cited in LCAS). The most common component of den sites appears to be a high amount of horizontal cover and abundant amounts of large woody debris, either down logs or root wads. Denning sites having large tangles of dead and down are preferred (Ruggiero *et al.* 1999).

Areas of moderate to heavy deadfall located in mature conifer (typically spruce/fir) or regenerating mixed conifer (>20 years since disturbance) characterize den sites (Ruggiero *et al.* 1999). Wind felled trees appear to be the most common form of protection, and Slough (in press cited in Ruggiero et al 1999) found 37 of 39 den sites in regenerating stands about 30 years of age, with 34 being located under inclusions of blowdown.

Denning sites must be in close proximity to foraging habitat to be functional and denning and foraging habitats must be interconnected by stands suitable for lynx travel (Koehler and Aubry 1994 cited in LCAS). The hunting range of females is restricted at the time of parturition, and their need to feed kittens requires an abundance of prey. Lynx, like other carnivores, frequently move their kittens until they are old enough to hunt with their mother. Multiple nursery sites are needed that provide kittens with overhead cover and protection from predators and the elements. Downed logs and overhead cover must be available throughout the home range to provide security when lynx kittens are old enough to travel (Bailey 1974 cited in LCAS).

Figure 23. Canada Lynx Analysis Units (LAU) #6 and #7.



Habitat Conditions in the Analysis Area. The analysis area encompasses Shoshone National Forest Lynx Analysis Units (LAU) #6 and #7, which total 283,815 acres (*see* Figure 23).

Within the 113,610-acre Upper North Fork LAU #6:

- 46,897 acres are classified as primary forested lynx habitat (spruce-fir potential vegetation types)
- 4,701 acres or 10% of the primary forested habitat is tentatively classified as denning habitat (large amounts of dead and down). Standard is to maintain 10% in denning.The 10% standard is currently being met, and is increasing due to the impending recruitment of dead and down material as a result of tree mortality caused by insect infestation. In the very near future the majority of the primary forested habitat will contain inclusions of dead and down material that provide the structure required for quality denning habitat.
- Currently insects are impacting 4,261 acres of the primary forested habitat (spruce-fir types) in the Upper North Fork LAU, 628 acres in the project area, and 107 acres within proposed treatment units; and these figures are continually increasing due to advancement of the insect epidemic. Epidemic insect infestation has caused potential lynx habitat to become unsuitable in the short-term (*see* Figure 24).
- 28,554 acres or 61% of the primary forested habitat is presently in the stand initiation structural stage, and is thus presently unsuitable habitat as a result of stand replacement fires occurring since 1988. There are no timber harvest areas in the stand initiation stage as no timber harvest has occurred in the Upper North Fork LAU in the last 20 years.

  Based on the LCAS, when more than 30% of lynx habitat within a LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities by federal agencies. It is important to note that the

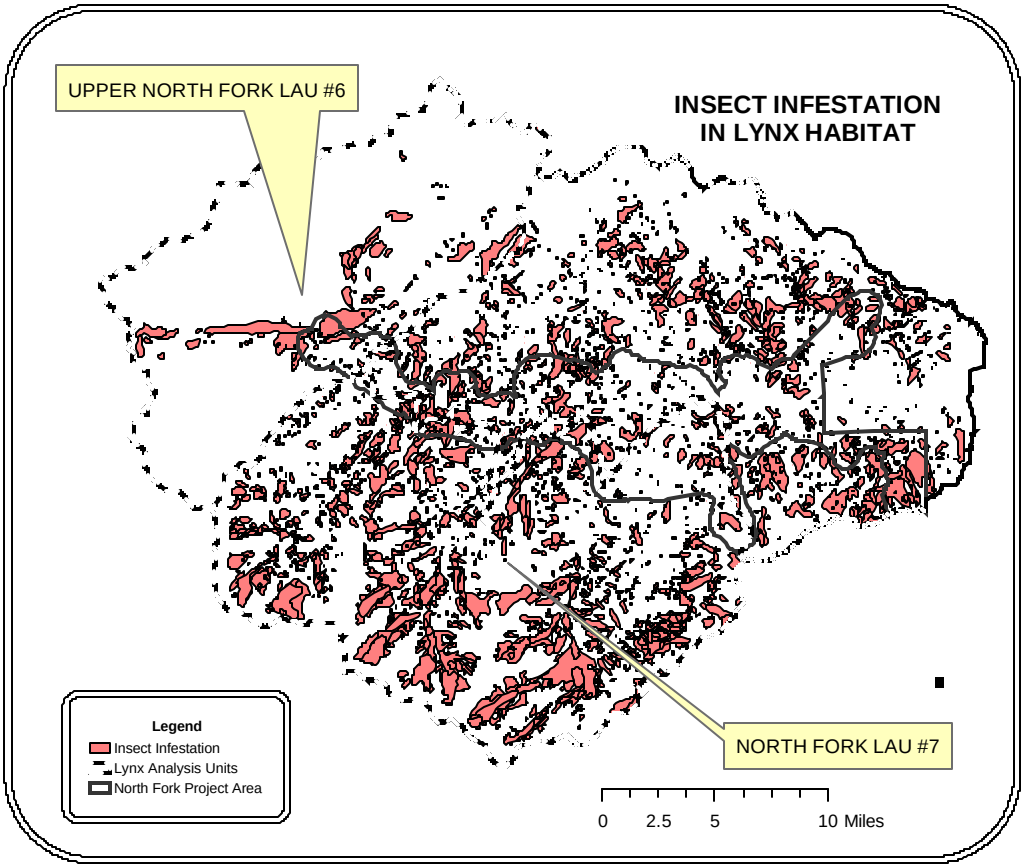
treatment areas being proposed within LAUs are in unsuited habitat or soon to be unsuited habitat due to canopy loss resulting from insect induced tree mortality.

Maintenance of the 70% suitable habitat standard cannot be met in the Upper North Fork LAU due primarily to the results of the Clover-Mist Fire of 1988. Although much of the potential habitat is presently unsuitable within the LAU due to wildfire and insect infestation, much of the remainder of the potential lynx habitat that is present is lacking quality lynx foraging areas (snowshoe hare habitat). The problem is not the amount of stands in the stand initiation stages but the distribution of the early seral and late seral stages within the area.

Ecologically the problem is a landscape matrix composed of large blocks of two seral stages (early stand initiation and late seral) with poor distribution, and the lack of early to middle seral stages preferred by snowshoe hare. Of major concern is the risk of losing much of the remaining late-seral forested area to insect infestation and/or wildfire in a short time period.

It appears that the problem can best be addressed by enhancing distribution of seral stages within the remaining areas of late succession forest such that both denning and foraging habitat is distributed within the daily cruising radius of a female lynx during the young rearing period. In addition, such action can reduce the risk of loss (to some degree) of a high percentage of the mature timber to wildfire in a short period. Vegetative treatment can enhance this interspersion of seral stages, accelerate regeneration by sanitation harvest and prescribed burning, and possibly reduce the spread rate and crown fire potential of wildfire. Sanitation harvest may or may not cause forested stands to become unsuitable (revert to the stand initiation stage); it is strictly dependent on the existing stand structure and the extent of insect induced mortality.

Figure 24. Insect infestation within potential lynx habitat.



Within the 170,205-acre North Fork LAU #7:

- 54,199 acres are classified as primary forested lynx habitat (spruce-fir potential vegetation types).
- Currently insects are impacting over 22, 490 acres (42%) of the primary forested habitat (spruce-fir types in the North Fork LA U and 870 acres within proposed treatment units. The infestation is expected to continue and possibly accelerate in the upper reaches of the spruce-fir zone in the LAU causing the loss of many additional mature spruce-fir stands.
    - 4,881acres or 9% of the primary forested habitat within this LAU is presently in the stand initiation structural stage, and is unsuitable habitat as a result of recent stand replacement fires. There are no timber harvest areas in the stand initiation stage as no timber harvest has occurred in the North Fork LAU in the last 20 years. Many more acres are expected to become unsuitable in the next two years as a result of insect induced tree mortality.
- 10,812 acres or 20% of the primary forested habitat is tentatively classified as denning habitat (old growth with large amounts of dead and down): however, due to the impending recruitment of dead and down material from tree mortality resulting from insect infestation, it is expected that the majority of the primary forested habitat will contain inclusions of dead and down material that provide the structure required for quality denning habitat in the very near future. Standard is to maintain 10% in denning.

At present, most timber stands in potential lynx habitat that are not in the stand initiation stage due to recent wildfire are late succession. Tree mortality in these mature stands as a result of insect and disease infestations ranges from 10-90%, depending on species and location. The mature forest overhead canopy is highly variable and decreasing at present as a result of tree mortality from the insect infestation. Loss of the overhead canopy is of concern relative to lynx habitat, at least until regeneration is well established to provide a dense canopy cover.

A small portion of the analysis area presently contains high densities of large woody debris, but the majority of the analysis area will recruit high volumes of large dead and down material in the next decade. Sufficient amounts of quality denning habitat will not be a concern in the future.

The major food sources for lynx are snowshoe hares and red squirrels. The availability of snowshoe hares during the winter period appears to be the limiting factor on lynx populations. A snowshoe hare density of more than one per 2½ acres appears adequate to support a viable lynx population. Nowhere in the analysis area has this density been documented or is it suspected. Alternate prey species such as pine squirrel and rodents are quite common in the analysis area.

Ruffed grouse, another alternate prey species of the lynx, is very limited in the analysis area due to the mature and declining status of the aspen, but blue grouse are present.

Lynx foraging habitat within coniferous forest types is generally one of three types:

- Early successional young forest where dense, multi-layered understory maximizes cover from ground level up to six feet. Due to the insect related loss of the overstory canopy within the analysis area, existing conifer regeneration is releasing and additional natural regeneration is expected to occur within the next two decades. Portions of the Clover-Mist burn that occurred in 1988 will be providing this type of habitat within the next decade.
- Older forests with a substantial understory of conifers or small patches of shrubs and young trees that provide dense cover that touches the snow in winter, and/or dead and down material that protrudes above the snow. Relatively few stands within the analysis presently area meet these criteria.
- Young, densely regenerating aspen stands with a well-developed understory can also provide good quality habitat for snowshoe hares and other potential lynx prey species, such as grouse, if there is sufficient ground cover within the stand. Recruitment of aspen stands with a high density of stems per unit area is a priority for hares. There are few (if any) aspen stands in the treatment area having a high density of stems, and the amount of aspen is declining. This decline is due primarily to deteriorating clones caused of apical dominance and conifer encroachment - symptoms of advancing succession.

Vegetation structure in the understory appears to be more important for hare abundance than does species composition. A complex mosaic of species and age classes is likely to provide the best overall habitat over the long term for the lynx, although it appears that spruce-fir habitat types, where lodgepole pine is a major seral species, are a basic component of good lynx habitat. Lodgepole pine is not a dominant species within the project area, as most timber stands are in the later stages of succession. However, lodgepole pine is a dominant species where fires have occurred, and is expected to be the dominant species regenerated as a result of prescribed burns.

In summary, the analysis area as well as the included LAUs is in a declining condition relative to providing stands of either early or late seral forest having a high-density canopy closure. Natural foraging areas for the lynx are presently limited, and the natural thinning or management treatment of the overstory that results in high levels of regeneration has the potential to provide both food and cover for the snowshoe hare in the future.

Effects on Canada Lynx. With any of the alternatives the dense overhead canopy would be lost in many stands. This would likely limit lynx use until regeneration is well established in approximately 10 to 30 years.

The potential for the action alternatives to adversely affect lynx denning activity, or affect productivity or recruitment is negligible and discountable. Adverse effects to denning lynx as a result of prescribed burns during the denning/young rearing or burning of slash piles containing natal dens are discountable. This is because fuel reduction treatments would for the most part involve broadcast burning and jackpot burning to be completed during the early spring (March through mid-May) prior to the denning period or late fall (October through December) after the young rearing period, depending on burning conditions. Burning of slash piles at log landings would be completed during December, January, or February when adequate snow cover exists, well outside the denning period.

Adverse effects during denning as a result of harvest activities are also negligible and discountable as harvest is limited to the summer/fall/winter period (July 1 to March 31). Limitation of treatment to these periods would avoid most risks of disturbing females or kittens at natal dens, which are generally, occupied during late May and early June. Any displacement that might occur during harvest operations would likely be incidental rather than chronic, and seasonal rather than year-round.

The likelihood of a lynx being struck by logging or burning related traffic is also negligible and discountable because the likelihood of lynx presence in the analysis area is extremely low.

Any of the alternatives would likely have a long term beneficial effect on individual lynx condition and productivity, as well as population recruitment if even a few individuals still persist in the general area. This is because the potential for high quality denning and foraging habitat would increase dramatically within 10 to 30 years. Enhanced habitat would result because of enhanced hare habitat caused by increased availability of early succession lodgepole pine of appropriate structure, increased amounts of complex dead and down structure for denning, and the presence of a dense overhead canopy due to forested regeneration throughout the LAUs. There is not a measurable difference between alternatives because very little potential habitat is being affected by human related activities.

With all alternatives, the short term direct effects on lynx habitat would be continuation of tree mortality and the associated loss of a high density canopy cover in many forested areas of potential habitat, likely causing avoidance of such areas by lynx. The differences between alternatives within the context of the analysis area would be immeasurable.

Short term direct effects of the action alternatives on denning habitat would be the reduction of a small amount of denning habitat due to reduction of dead and down material in the treatment

areas. However, within the treatment areas few potential denning areas exist. Quality foraging habitat does not exist near denning habitat, and the majority of treatment areas are in close proximity of high human concentration areas generally avoided by lynx. Therefore, effects to denning habitat would be negligible.

The short term direct effects of the action alternatives on lynx foraging habitat also appear to be negligible. Although timber harvest has the potential to cause a temporary reduction in snowshoe hare habitat, the effect would be not be measurable as snowshoe hare habitat affected is of marginal quality in its current condition.

The analysis area is in a declining condition relative to providing stands of late seral forest having a high density canopy closure, either with or without treatment. With or without management action being initiated, the absence of a high density tree canopy generally believed to be associated with suitable lynx habitat would likely limit lynx use until regeneration is well established in approximately 10 to 30 years.

Under the No Action Alternative, a major portion of the high-density tree canopy generally believed to be associated with suitable lynx habitat would likely be lost. The high amounts of dead and down material would provide high quality sites for denning purposes, and once tree cover is well reestablished the area would provide habitat for the snowshoe hare, the primary prey species. The natural thinning of the overstory that results in high levels of regeneration has the potential to provide both food and cover for the snowshoe hare.

The indirect effects of the action alternatives are generally beneficial to lynx foraging habitat due to regeneration of lodgepole pine and aspen, primary components of good hare habitat. Although timber harvest may result in a reduction in snowshoe hare habitat over a several year period, the effect on lynx foraging habitat would be negligible and discountable as the habitat affected is not very productive in its current condition due to the lack of abundance, distribution, and structure of lodgepole pine.

The standard from the LCAS for denning habitat is that 10% of identified potential lynx habitat within a LAU must be maintained as denning habitat in patch sizes of at least five acres. Current data indicates that denning habitat within potential lynx habitat in the analysis area is near this level. Neither action alternative would have a measurable effect on the amount or distribution of denning habitat.

At present, the aspen type is being lost through lack of disturbance and natural succession to conifers on a vast scale except in the upper North Fork area above Pahaska, which burned in 1988. Retention of as much aspen as possible would appear to have a beneficial long term effect on snowshoe hares and lynx. The action alternatives would enhance a portion of aspen stands in the analysis area by reduction of conifer encroachment and regeneration of decadent clones by use of prescribed fire. Retention of aspen through periodic disturbance and cycling back through early seral stages would appear to be beneficial for the lynx forage base over time.

Cumulative Effects on Lynx

The Canada lynx prefers closed canopy stands supporting high densities of snowshoe hares. Natural disturbances are causing major reductions in the canopy. The incremental additive effects of the action alternatives would be beneficial when considering the status of lynx in all ownerships. Secure areas would be maintained on-Forest, and earlier seral habitat would enhance snowshoe hare habitat and thus foraging habitat for the lynx. The incremental or cumulative impact of this single action (either action alternative) when added to all other past, present, and reasonably foreseeable actions in all jurisdictions has little measurable influence on the threats to the lynx over the long term. Although either action alternative makes a small beneficial contribution toward conservation of the species when considering cumulative effects, this action

cannot offset or compensate for past, present, and reasonably foreseeable adverse cumulative effects caused by natural disturbance, non-federal actions or actions on non-federal lands. Additional discussion of cumulative effects are included in Section 3.10.

Determination of Effects on Lynx and Rationale for the Determination

During the period of operations, short term direct effects would be expected to be adverse on some individuals, but due to the low probability of lynx being present, the effects would most likely be insignificant (immeasurable), or discountable (extremely unlikely). No permanent displacement would be expected. No measurable effects would be expected on productivity and recruitment of lynx. No mortality of lynx from accidental or illegal taking would be expected as a result of the action alternatives.

The long term indirect effects of this action would be expected to be beneficial from a habitat value perspective. By providing more optimum habitat conditions on these project areas in the future, and due to conscious design to move toward enhanced habitat conditions for the lynx, this area could contribute to an increase in productivity and recruitment if future projects in this area also contribute to such favorable conditions across the landscape.

After reviewing the current status of the Canada lynx, the environmental baseline for the analysis area, the effects of the action alternatives, and the cumulative effects, it is the determination that the action alternatives, as proposed, "may effect, but are not likely to adversely affect" the Canada lynx. No critical habitat has been designated for the lynx therefore none would be affected.

The reasoning for this determination is because the conservation and mitigation measures contained in the LCAS and in the Forest Plan, described above, were integrated as project design features into the design of this proposal in order to achieve the enhancement intent of Section (a)(1) of the Endangered Species Act. This section of the Act requires "affirmative conservation" programs be implemented, which implies that enhancement actions be taken when appropriate and when opportunities exist.

Long term enhancement, and short term retention of essential habitat conditions that are favorable and sustainable to the lynx was a major consideration in design of this proposal. Although a remote possibility, short term displacement of individuals could occur; however, long term benefits relative to habitat value are positive.

3.2.3 Sensitive Wildlife Species

This discussion is to document the effects evaluation for all designated Region 2 sensitive wildlife species that could possible be affected by this proposal. Region 2 of the Forest Service has designated some species of wildlife, fish, and insects as sensitive, thus requiring an in-depth look during project design and analysis.

All regionally designated sensitive species for Region 2 (R-2) that are known to occur on or near the Shoshone National Forest were considered in this analysis. To determine which species could occur within the analysis area or be potentially affected, habitat requirements based on the literature as well as species occurrence records for the area were reviewed. The Wyoming Natural Diversity Data Base was consulted for known locations of sensitive species in the analysis area. The habitat requirements of the species were then compared with the habitat present in the analysis area to determine potential occurrence based upon habitat relationships.

The potential effects of the treatments on habitats or individuals of each species in relation to their habitat requirements, and a determination of effects on populations of each species are made. The preparers are familiar with the area and have conducted at a minimum a project area inspection for sensitive species and their habitat. They have completed an on-the-ground

evaluation of the general habitats to determine potential occurrence, the existing habitat value, and potential habitat capability of the area. The degree of inventory and reconnaissance was commensurate with the risk associated with the proposed action and alternatives, the degree of certainty desired, and the level of knowledge already at hand.

Sensitive Wildlife, Fish, and Insect Species. Thirty-one wildlife species, three fish species, and one insect species listed on the Region 2 sensitive species list are known or suspected to occur on the Shoshone National Forest or immediately adjacent to the Forest. All these species were evaluated and the data is summarized in the wildlife specialist's report (project file). Only those with regard to the effects of this proposed action, species whose habitat would be affected, or those species of which individuals could be potentially affected were considered to be species relevant with regard to this proposed action, and were analyzed and discussed in depth in this document. Species that occur on the Forest but are outside the effects of the proposed action, geographically or biologically, were eliminated from further review. Preliminary analysis results for all sensitive species on the Forest are contained in the project file.

For narrative discussion purposes sensitive species that occur, or that could occur in the analysis area have been grouped according to the habitats in which they occur; and effects are discussed in that context. Additional limiting factors will be listed if it is helpful in determining effects, or the significance of effects, on specific species.

Sensitive species that are also Forest Plan MIS will be discussed in the following section on MIS. Those sensitive species that are also R-2 sensitive species are pine marten, goshawk, peregrine falcon, and Brewer's sparrow.

Cumulative effects to sensitive species are included in Section 3.10.

Riparian/Wetland Related Species (Columbia spotted frog, northern leopard frog, western boreal toad, water vole, river otter, harlequin duck, and fox sparrow). This discussion is based on review of the following literature and personal experience and observation: WYNDD 2002, Baxter and Stone 1980, Anderson 2002, Pearson 1999, sensitive species survey information collected from 1995 to present, and Forest monitoring reports. Wetland and riparian types provide the primary habitat for these species, as they are usually found near a permanent water source. Sensitive riparian related species that are may be present in the treatment area are the Columbia spotted frog, northern leopard frog, western boreal toad, water vole, river otter, harlequin duck, and fox sparrow. All these species except the fox sparrow require moist environments and are generally found near permanent water. The fox sparrow prefers shrub type vegetation associated with riparian and wetland types. The riparian and wetland areas within the proposed treatment area are likely to provide habitat for these species. A brief discussion of riparian/wetlands habitat areas and conditions are included in Sections 3.3.3.

Few surveys have been completed for amphibian species on the Forest. The Columbia spotted frog, western boreal toad, and northern leopard frog are likely present in the project area. Trends are not known, but based on habitat are assumed to be relatively stable.

Many small mammals exist in the area, and suitable habitat may exist within the project area for sensitive species such as the water vole. An in-depth inventory of vole habitat has not been completed. Habitat for the water vole is restricted to a specialized habitat type associated with wet riparian meadows within 100' of mountain streams containing grasses, sedges, and shrubs in alpine and subalpine areas between 8,000 and 10,000 feet. Good habitat consists of deep, narrow stream channels, with over-hanging banks, with grass and forb vegetation along the banks. Trends on the Forest appear stable in the areas of known suitable habitat (Klaus, 2004). Because treatment areas are generally less than 8,000 feet in elevation and specialized habitat is generally unavailable in the project area, it is unlikely that water voles are present in the treatment areas.

River otter are found primarily in the North Fork River and the lower reaches of larger tributary streams. Trends are not known, but based on observation and anecdotal evidence populations appear to be stable on the Forest.

Based upon in-depth inventory over a several year period, harlequin ducks are an uncommon species on the forest. They have been documented in several areas of the analysis area. They require swift flowing streams having clear water, rocky bottoms with some areas of riffles and shallow water; in addition to forested bank vegetation and hiding cover. Trends are not known.

The fox sparrow is a fairly common summer resident in western Wyoming. It prefers riparian areas containing deciduous types within coniferous forest areas. Any action that enhances the riparian shrub community is beneficial to this species. Trends are assumed to be stable on the Forest based on habitat, as bird counts off forest appear stable.

Determination

Because of the above factors, it is the determination that either of the action alternatives may affect individuals but are not likely to cause a trend to federal listing or loss of viability of the Columbia spotted frog, northern leopard frog, western boreal toad, water vole, river otter or fox sparrow.

Northern three-toed woodpecker, black-backed woodpecker, olive-sided flycatcher, golden-crowned kinglet, and boreal owl

This discussion is based on review of the following literature and personal experience and observation: WYNDD 2002, Anderson 2002, Block et.al. 1999, Reynolds 2002, Hayward 1994, Luce 1999, Cerovski 2001, sensitive species survey information collected from 1995 to present, and Forest monitoring reports. The northern three-toed woodpecker, black-backed woodpecker, olive-sided flycatcher, golden-crowned kinglet, and boreal owl are sensitive species that could potentially be affected by this proposal. Although population trends for all these species are not known, based upon known occurrence data it appears that populations are viable and stable.

The general habitat preference for this group is mature coniferous forest or mature coniferous forest mixed with aspen. All except the golden-crowned kinglet require or use snags to a high degree.

There has been over the past several years, and will continue to be a tremendous recruitment of conifer snags over the majority of the analysis area in the near future. Aspen snags are presently available in low densities due to the over mature status of aspen clones, but would be in limited supply in the future due to the eventual loss of aspen clones due to the lack of disturbance.

Limited surveys indicate boreal owls are present in the northern portion of the Forest, and based on habitat occurrence it is likely that they occupy some portions of the analysis area. Trends are not known, but potential mature forest habitat has been stable until the past several years.

The northern three-toed woodpecker and the olive-sided flycatcher are especially attracted to forested areas that have burned portions with abundant snags, and these preferred habitats exist in recently burned areas within the analysis area. Population trends on-Forest are not known, but habitat trends appear to be upward due to the recent occurrence of large fires.

Generally, logging has a negative effect on woodpeckers and other snag related species. Retention of some snags, planning for long-term recruitment of snags, and leaving unlogged areas appears to be a good management strategy for maintaining or providing quality woodpecker habitat.

Effects on northern three-toed woodpecker, black-backed woodpecker, olive-sided flycatcher, golden-crowned kinglet, and boreal owl.

With the No Action alternative, habitat value for the northern three-toed woodpecker, black-backed woodpecker olive-sided flycatcher, golden-crowned kinglet, and boreal owl would

continue to improve for the next several decades due to the increasing number of large snags over the majority of the analysis area.

With implementation of the action alternatives, a decline in habitat value for the snag related species in both the short term and long term is expected within the treatment area. This is due to the removal of large snags. Outside the treatment area, as in the No Action alternative, habitat value would increase due to the tremendous increase in snag numbers. Under the action alternatives, negligible effects to habitat quality would occur for golden-crowned kinglet, as little change in mature "live" coniferous forest would occur.

However, habitat conditions to ensure viability of all these species within the analysis area were part of the design criteria with patches and corridors of forested land being left untreated.

Determination

For these sensitive bird species, it is the determination that either of the action alternatives may affect individuals but are not likely to cause a trend to federal listing or loss of viability of the species.

Sensitive Fish Species. Due primarily to hybridization and habitat modification range wide, Yellowstone cutthroat trout are listed as a sensitive species in R-2. In the current Forest Plan, game trout were selected as the MIS for aquatic habitat.

Historically, native Yellowstone cutthroat trout (YSC) occupied the mostly perennial streams that occur within the analysis area. Over the years various exotic species of trout, such as rainbows and other cutthroat sub-species, have been introduced in the river and reservoir. Extensive cross breeding with Yellowstone cutthroat has occurred. Although fish planting no longer occurs in the North Fork or Buffalo Bill Reservoir, only hybridized populations of Yellowstone cutthroat trout exist today in the analysis area (Kruse, 1998). Currently, resident YSC are found in the main stem of the North Fork and its tributaries. They remain in the system year round. Migratory YSC from Buffalo Bill Reservoir are also found in the main stem and its tributaries during the spawning and rearing season. YSC spawn in clean pea to egg size gravels located in riffles. They spawn about mid March through the end of June depending on environmental conditions. Generally, fry emerge from the gravels in August (Yekel, pers comm.).

Mountain suckers (MTS) are found in the main North Fork river and its tributaries. They spawn in the spring about the same time as YSC. They are common in the North Fork drainage where suitable habitat exists. Lake chubs (LKC) are found primarily off the Forest in slower backwaters in the lower main stem river near and in Buffalo Bill Reservoir outside the area of analysis.

Other Stream Fish Species. Mountain whitefish are found throughout the drainage. Some brown and lake trout are found in the North Fork, primarily in the lower parts of the drainage and in the reservoir. Mountain whitefish, brown trout and lake trout all spawn in the fall.

In addition to trout species the North Fork and its tributaries contain other non-game fish species including long nose dace and long nose suckers. Where suitable habitat is available these species are common (Yekel, pers com.).

Effects to Fisheries. Under Alternative 1, no management actions to reduce fuels would be implemented; therefore, no impacts to fisheries associated with this project proposal would occur.

The increased potential for a severe fire affecting the watersheds could increase nutrient availability after the fire. The indirect effect would be an increase in aquatic plant abundance and possible changes in the aquatic invertebrate and vertebrate communities. This potential is higher under Alternative 1 than the action alternatives.

Changes to flow regimes, sediment or chemical loading are not expected under the action alternatives (*see* Section 3.3 for aquatic ecosystems and aquatic life discussions).

Determination

Yellowstone cutthroat trout, Mountain suckers, and Lake chubs are the three sensitive species with possible occurrence in the analysis area. Because of the above factors, any of the action alternatives "may affect individuals but are not likely to cause a trend to federal listing or loss of viability of sensitive fish."

3.2.4 Management Indicator Species (MIS)

Management indicator species (MIS) are wildlife species that are used as planning tools to promote more effective management of diversity and wildlife habitats on National Forest lands. MIS served as the basis for formulation of Forest Plan diversity/wildlife conditions defined by goals and objectives, Forest Plan benchmark levels of diversity and wildlife, Forestwide direction, standards, and guidelines relative to diversity and wildlife, and Forest Plan management area direction and standards for diversity and wildlife. In addition, MIS served as the basis for integration of diversity and wildlife into alternatives, into descriptions of expected future conditions, for projection of wildlife trends, and to guide and monitor wildlife diversity, thus providing a focus for evaluating and managing viability and diversity, and offering a clear focus for inventory and monitoring for Forest Plan implementation.

Seventeen wildlife species, in addition to game trout, were selected during the forest planning process to be management indicators. Methods used to select indicator species or groups of species are explained in detail in the planning records for the Forest's Land and Resource Management Plan. MIS habitat relationships used at the time the Forest Plan was written were revalidated in 2002; the final report (dated November 27, 2002) is available at the Forest Supervisor's Office.

The needs of all MIS within the analysis area, or MIS that may be affected by this proposed action, were considered and addressed in this project analysis relative to potential effects, Forest Plan direction, and monitoring. Habitat exists within the analysis area for sixteen species of MIS, and all are known to occur in the area, as least during a portion of the year. A programmatic monitoring program and plan is in place to track changes in populations and habitat.

The effects of the proposed action on habitat within the project and analysis areas, habitat trends Forestwide, individuals within the project and analysis areas, and population trends forestwide for each MIS were evaluated, as was overall diversity. The preparers are familiar with the area and have conducted at a minimum a project area inspection for MIS and their habitat. They have completed an on-the-ground evaluation of the general habitats to determine potential occurrence, the existing habitat value, and potential habitat capability of the area. The degree of inventory and reconnaissance was commensurate with the risk associated with the proposed action, the degree of certainty desired, and the level of knowledge already at hand.

Those MIS that are listed threatened or endangered species are discussed in the above section on threatened and endangered species. Those MIS that are listed species under the Endangered Species Act are gray wolf, and bald eagle, and grizzly bear.

Those MIS that are also classified as R-2 sensitive species are discussed in this section. Those MIS that are also classified as sensitive species are pine marten, goshawk, peregrine falcon, and brewer's sparrow. An effects determination related to their sensitive species status as well as a conclusion relative to the project effects on each MIS's forestwide viability and trend is stated for each R-2 sensitive/Forest MIS.

Standards and guidelines relative to diversity and MIS are generally based on providing habitat components on areas of land that are meaningful to a mix of species. Therefore many standards and guidelines are evaluated relative to the analysis area, which is much larger than a project area.

Individuals of a MIS may be affected at the project level scale and/or analysis area scale, and the effects to individuals when considered in the context of the Forestwide population in which it is a part, are addressed. Species viability and population trends for these species must be viewed from within the total ecosystems that sustain them rather than from a project level view. Population trend data take years to gather since individual years are the data points in trend analysis. In addition, it is generally not possible to positively conclude cause/trend relationships due to single factors such as forest management activities like timber harvest or past fire suppression activity. Trend analysis and conclusions are especially difficult when populations are highly mobile or migratory, especially when the Forest provides habitat for only a portion of the year, and many influencing factors, habitat, and land ownership are outside of federal control..

Population viability for these species cannot be effectively evaluated and cannot be maintained at the artificially small scale of most projects, and trends cannot generally be assessed on the small scale of most projects. This is because the yearly cruising radius or home range of most individuals extends beyond the project area, and the range of most populations (and even subpopulations) of a species is much greater than the project area parameters. Population size and dynamics, habitat area and dynamics, threats and risk factors, and genetics as well as spatial and temporal dimensions of population changes are all essential considerations of species viability analysis.

The discussions relating to the life history, habitat requirements, and effects on each MIS focuses only on those factors that are relevant to this effects analysis and associated decision in the context of threats, risk factors, limiting factors, and opportunities on National Forest System lands.

Cumulative effects relative to MIS are included in Section 3.10.

Elk/Mule Deer. Elk and mule deer are Forest Management Indicator Species (MIS) that were identified during scoping as being of concern relative to this proposal. Both are very abundant common species that are hunted. They were selected for this analysis because they represent early succession forest and sagebrush-grassland types. As elk and deer habitats in forested areas and sagebrush-grasslands are very similar, it will be assumed that analysis of effects for elk will also be applicable to mule deer.

Sagebrush is an essential habitat component for these species, at least on a seasonal basis. Elk and deer forage in the sagebrush grassland type a high percentage of time during the fall, winter, and spring periods. Sagebrush is a primary food component for deer during winter, and juniper found in sagebrush grasslands is important as an emergency food source during harsh winters (Hanson 1974). Elk forage in the sagebrush grassland, but the grass/forb understory is the preferred component except in extreme conditions. Sagebrush and related vegetative species also provide cover for deer yearlong, and sagebrush is one of the preferred cover types for newborn deer and elk during the birthing period. Almost all portions of the forest are inhabited by these species during some portion of the year, and the North Fork analysis area is no exception.

Existing habitat conditions for elk and deer in the North Fork analysis area are less than the desired condition relative to horizontal diversity (timber age-class distribution), maintenance of minor vegetative types (deciduous vegetative types and sagebrush/grasslands), and distribution of structural stages. Habitat characteristics of hiding cover, security areas, and habitat effectiveness meet minimum desired conditions in the overall analysis area. Thermal cover is below the minimum desired condition of 20%. Cover quality, both thermal and hiding, is decreasing due to tree mortality as a result of insect infestation. The continuing reversion of the mature forest component to earlier successional stages as a result of insect induced tree mortality and wildfire is causing an increase in overall habitat quality for these species.

As described in the General Habitat Discussion section, there are currently 162,055 acres (or 47% of the forested acres) providing hiding cover for elk and mule deer. In addition, hiding cover is

well distributed throughout the area, with at least 60% of the meadow perimeters, 75% of the roads and more than 40% of the streams all have hiding cover available. Thermal cover is low, at 51,685 acres (or 15% of the forested acres), as the dead trees are not providing thermal cover.

Healthy, viable populations of elk exist on the Forest, with populations being at or above objectives in many areas. Overall, population trends have been upward since the 1980s, and hunter management the past several years has been oriented to bringing the populations down to objectives (Forest Plan Monitoring and Evaluation Report, 2002). Hunting, combined with other cumulative factors of predation by large predators and drought conditions, is presently bringing the populations down. The major threats to the species on the northern portion of the forest are development of the privately owned lands that provide crucial winter range adjacent to the forest.

Based on 2001 data, mule deer numbers in the upper Shoshone Herd Units are at the objective number of 12,000; the Cody Herd unit has 6,500 elk, which is above the 5,600 objective numbers. Both these herd units are on a slightly decreasing trend over the past few years (Forest Plan Monitoring and Evaluation Report, 2002).

The existing population of elk within the Wapiti Ridge Herd Unit is presently close to objective, and herds of resident elk can be found in most of the North Fork drainages yearlong. In addition, hundreds of migratory elk traditionally use lower breaks and benches in the analysis area during fall, winter, and spring as they move from summer ranges in Yellowstone Park and the Teton Wilderness. Elk are a common sight along the North Fork corridor during fall, winter, and spring, and are also very common during the summer at higher elevations. The sagebrush/aspen fringe at lower elevations in the analysis area is also used for calving in the spring as shown in Figure 14. The analysis area currently has approximately 13,000+ acres of sage/grassland available for this species.

Mule deer also have healthy viable populations on the Forest, as well as in the analysis area. Again, both resident herds and migratory herds are found in the analysis area.

Effects on Elk/Mule Deer. Under The No Action alternative the loss of canopy cover has the potential to change elk distribution, use, and movement patterns within the analysis area, especially during the hunting period. Effects are probably of little consequence to individual animals except during the hunting season, when they are more vulnerable to hunters due to loss of tree cover.

Forage and browse availability would be enhanced to some degree in both the short term and long term due to the insect infestation setting back succession and decreasing conifer competition with deciduous species in wetland, riparian, and aspen types. Thermal cover for elk would continue to deteriorate in the short term, and remain low over the next 20 years, until stands are regenerated and reach suitable size.

Hiding cover would continue to be adequate though many cover stands will provide marginal cover for several decades until advanced regeneration occurs (*see* Section 3.2.1). Local changes in movement patterns may occur in the long term due to blockage by extreme quantities of large downfall in some stands. Based on the acres presently impacted by roads, secure habitat would remain available on over 95% of the analysis area, however much of the secure area would be unavailable due to snow conditions during winter and spring, and habitat effectiveness decreases substantially adjacent to the highway corridor during the high use summer/fall recreation period (mid-May through November).

Under the action alternatives habitat value for elk relative to forage and browse availability in forested areas would be enhanced more than in the No Action alternative in both the short term and long term. This is because competition from conifers in wetland, deciduous, and riparian areas would be reduced by management actions even more than would occur naturally. The quality of hiding cover would decrease a small amount within treated areas due to the removal of

standing dead trees (*see* Section 3.2.1). Hiding cover amounts would still be above Forest Plan standards, though many stands would have marginal cover value. Thermal cover would decrease slightly because of treatments, but few stands in the project area presently provide thermal cover.

Succession in the areas of sagebrush treated would be set back by patches created by disturbance; interspersion would be increased by retention of patches not treated; the grass/forb understory component of sagebrush would be enhanced relative to composition and production; and overall habitat value of the area would be improved for elk.

The treatment area and areas immediately adjacent to roads (within ¼ mile) would be largely unavailable to elk during harvest and burning activity as disturbance would cause temporary displacement of elk from the area. Short term direct effects on habitat effectiveness due to temporary disturbance or displacement would be expected to be adverse, but would most likely be insignificant (immeasurable) as the elk are somewhat acclimated to human activities and the distance and duration of displacement is expected to be minimal. No permanent displacement would be expected.

No measurable effects would be anticipated on productivity and recruitment of elk because they are somewhat acclimated to human activity, and any displacement that occurs would move elk to other adjacent secure areas having sufficient forage for survival.

Under Alternative 3, effects on individuals and habitat within treated areas would be similar to Alternative 2 except that harvest activity would occur on a smaller area.

In summary, post-treatment habitat conditions for elk and deer would be more toward desired condition than existing conditions as structural diversity, deciduous species, and sagebrush/grassland would be enhanced to some degree. This action would contribute toward attainment of Forest Plan goals/objectives/standards (FP Chapter III) in the analysis area relating to elk and deer, and the long term maintenance of sustainable desired habitat conditions for elk and deer would be met over time. This action would contribute to maintenance of objective populations (FP EIS Chapter III) within the herd unit and Forestwide over the long term.

This action may adversely impact individuals of this species; however, none of the alternatives relating to this project are expected to have any measurable effects on populations within the herd unit, or on Forestwide population trends or viability of this species as this action strives to attain and/or maintain sustainable habitat conditions and objective populations over time.

Bighorn Sheep. Bighorn sheep is a Forest MIS that occurs in the analysis area. The need to maintain and enhance transition, wintering, and birthing habitat for this species was part of the purpose and need. The bighorn is related primarily with grassland types, in close association with unique habitat (cliffs, rock outcroppings, and talus) that provides security cover for the species. Sheep generally summer in the higher subalpine and alpine habitats and winter in the sagebrush grassland types at lower elevations along the North Fork corridor.

Although bighorn sheep use timber types, they clearly show avoidance behavior relative to large or dense stands of timber. Many of the important bighorn migration routes, transition ranges, and wintering areas in the North Fork area have become encroached by conifers to the degree that they are no longer areas of preferred habitat.

Most herds or the Forest are under objective, however the bighorn sheep population in the North Fork area appears to be near objective and stable over the past decade, although the trend in the quality of habitat is downward due to advancing succession (Forest Monitoring Report 2002).

Effects on Bighorn Sheep. As the majority of encroaching trees on much of the bighorn sheep habitat are relatively scattered and vigorous, they are not as highly susceptible to insect and

disease infestation as older more dense stands. Therefore, reduction of encroachment by the natural disturbances of insects or disease is unlikely.

The No Action alternative allows the successional process of conifer encroachment into sagebrush and grassland types adjacent to sheep security habitat to continue uninterrupted, thus limiting the amount of habitat available to sheep on transition, wintering, and birthing habitat. Use of habitat a farther distance from security cover (cliffs and rock outcroppings), or use of timbered habitat increases the susceptibility of sheep to predation.

The action alternatives would reduce the amount of encroachment in selected areas of bighorn sheep habitat. The would allow easier and more secure travel corridors, more efficient use of habitat adjacent to security cover, enhance the availability and quality of forage in treated areas, and reduce the risk of predation on sheep in those areas. Short-term displacement of some individuals may occur, but long-term habitat value would be enhanced.

By implementing either of the action alternatives, the availability of sheep habitat in treated areas would increase over the long term and this will increase the habitat capability within the analysis area. This action may adversely impact individuals of this species in the short term, however neither of the action alternatives are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

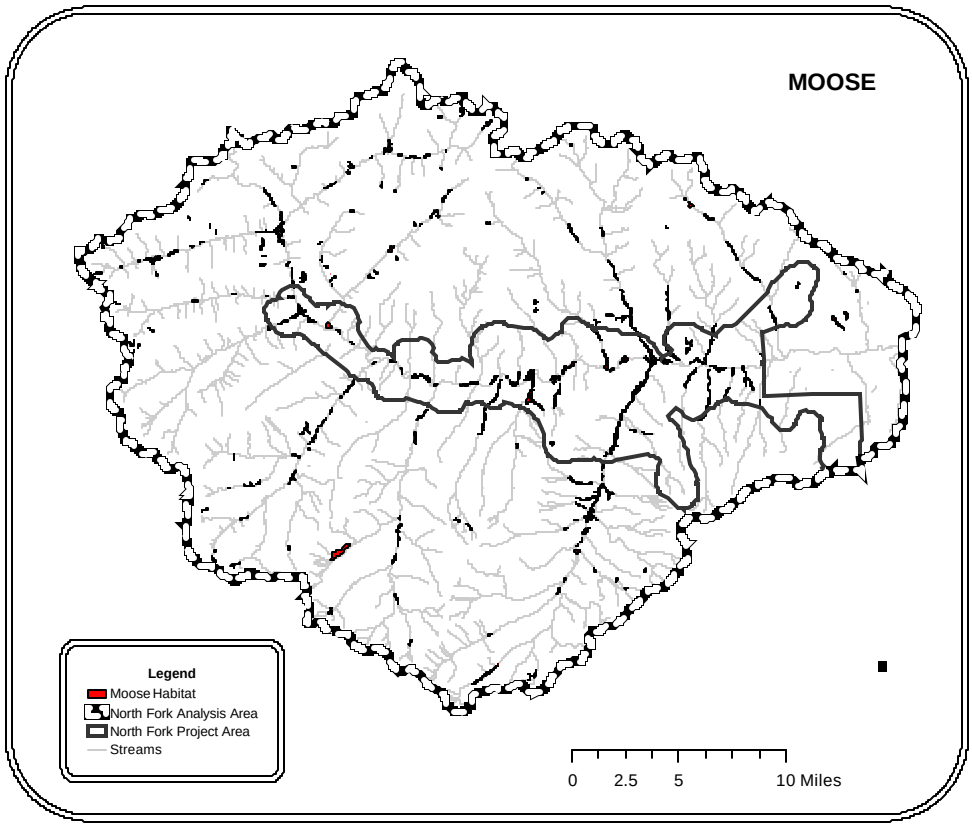
Moose. Moose is a Forest MIS that occurs in the analysis area. The moose is dependent on deciduous riparian and early succession forest, and was selected for the analysis because of these relationships. Subalpine fir, along with shrubby browse species (aspen, willow, etc.) provide winter forage for moose and are heavily utilized in some areas where young stems exist. Effects on critical components of moose habitat relate primarily to deciduous riparian areas, browse availability (primarily willow, aspen, and other deciduous species), and the subalpine fir component for winter food and cover. Approximately 4,285 acres of riparian habitat with a deciduous component is available for moose currently in the analysis area. Habitat value or capability for moose is low due to the dominant late successional characteristics in both riparian areas and forested uplands (*see* Figure 25).

Approximately 241 acres of deciduous riparian type along the North Fork River is planned for treatment. There are approximately 185,000 acres of suitable moose habitat across the Forest currently, so this analysis area represents a small amount of the Forest's moose habitat.

A small population of moose uses the analysis area. Shrub species such as aspen, willow, alder, and birch are important moose habitat components that provide browse throughout the year. Browse species are presently in a declining condition within the analysis area, with numerous remnant dead clumps of several species evident. Most aspen clones in the area are mature, with declining large stems and minimal regenerating suckers available as browse.

The moose population on the northern portion of the Forest appears to be in a declining population trend over the past decade due primarily to loss of early succession habitat (i.e., riparian and aspen), predation by grizzly and wolves, and drought. Based on 2001 data, the 125 moose in the Shoshone Herd Unit are below the objective level of 150, and the trend of this herd over the past 5 years has been somewhat stable.

Figure 25. Riparian deciduous habitat within the analysis area.



Effects on Moose. The No Action alternative would enhance the subalpine fir regeneration through natural succession. This is because subalpine fir is a late seral species and in some areas where fir is established, loss of overstory trees allows release of young fir due to reduced competition. This alternative would also allow the continuation of the encroachment of conifer species into the wetlands, riparian areas, and deciduous stands. Although fir encroachment would provide a beneficial food source for the winter period, competition from such encroachment would cause a decrease in the availability of deciduous browse, which is also an essential food source for moose. As deciduous vegetation is in a decline, the abundance of these types would decrease in the long term with many stands deteriorating to the point that they would be lost, unless a major disturbance event such as wildfire occurs.

Under the action alternatives, long term habitat value would increase due to browse species enhancement in riparian areas (aspen, willow, birch, subalpine fir, etc.) as well as in upland stands where burning occurs within stands where an aspen component exists.

Although moose do not appear to be as susceptible to motorized disturbance as elk, the action alternatives would likely cause temporary displacement from the treatment areas during harvest and burning activity.

By implementing either of the action alternatives, the amount of moose habitat would increase slightly over the long term and this will increase the habitat value within the analysis area. This action may adversely impact individuals of this species in the short term, however neither of the action alternatives are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

Pine Marten. This discussion is based on review of the following literature and personal experience and observation: Buskirk 2003, Ruggiero et al.1999, Clark 1997, sensitive species survey information collected from 1995 to present, and Forest monitoring reports. The pine marten, a sensitive species as well as a Forest MIS for late succession coniferous forest, prefers habitat that includes some late succession stands of mesic coniferous forest in contiguous blocks with a high degree of canopy closure; a large amount of dead, down and decaying woody material; and a complex physical structure near the ground. It generally avoids large open areas such as large meadows or clearcuts. Spruce-fir forests are preferred, but more mesic Douglas-fir and lodgepole pine types are used as well. See Figure 12 for distribution of old growth in the analysis area.

Canopy cover over 50% appears to be preferred, and areas having less than 30% canopy cover appear to be avoided. Removal of canopy often affects these species adversely, depending on the scale of canopy removal. The loss of canopy in mature spruce-fir stands in the analysis area due to insect infestation and future wildfire is expected to be excessive. See Figure 24 for insect infestations in the preferred spruce-fir types. Physical structure of the forest appears to be more important than species composition of the vegetation, and while suitable habitat is not necessarily old growth, there is little question that some preferred components are representative of old growth structure.

Habitat does exist in the treatment area for pine marten in the upper drainages of the North Fork, but is declining in both quality and quantity due to the heavy mortality being caused by the insect epidemic. Pine marten, which require large blocks of undisturbed late seral, forested habitat to accommodate their home range sizes do occupy much of the existing suited habitat. Retaining or enhancing this habitat structure (large down, decaying wood, live canopy closure exceeding 70 percent in the spruce/fir type) would encourage the persistence of a pine marten population, and provide habitat for other species. However, it must be noted that retention of this structure over a large portion of the analysis area is not possible in the long term due to the natural disturbances of insect infestation and the resulting deteriorating condition of the live canopy in most of the older spruce/fir stands.

Stands in which dens of marten have been found are characterized by downfall, snags, large trees, hollow trees, and stumps. It appears that the natural recruitment of many large snags, decadent broken-top trees, and downfall as potential components of structural diversity necessary for den sites is occurring, however the closed-canopy forest generally required for denning is rapidly declining.

Viable populations of marten exist on the Forest and are common in suitable habitat. Based upon the availability of mature forest habitat, populations over the past several decades have most likely been at an all time high. Population trends appear to have been stable the past several decades, although harvest across the state has decreased likely due to fur prices. When fur prices were up trappers still consistently harvested individuals as allowed by State regulations. A long-time trapper and guide in the Cody area that has historically trapped the North Fork area generally trapped over three dozen per season when fur prices were high He has also noted that in the Clover-Mist burn area he has not noted any evidence of marten since 1988, where previously there was a good marten population (Blackburn, personal contact).

Effects on Pine Marten. Under the No Action alternative, loss of the overhead canopy due to insect infestation associated with large trees has occurred on many stands and is predictable on many of the remaining stands. This loss of canopy has decreased habitat value of foraging habitat for marten. Large snags and dead and down material is presently contributing to a more complex near ground structure, and would continue to do so in the short and long term. Increased amounts of snags, dead and down, and a more complex near ground structure would be beneficial as denning

and foraging habitat for this species. However, without a high level of canopy cover, habitat value for the pine marten would likely decline for a long period.

The action alternatives would have similar habitat values as the No Action alternative in the short term. Mature live stands that do exist are generally retained. In the long term, habitat values would be lower in treated areas as a result of removal of snags and dead and down by harvesting and/or burning. Untreated areas would continue to provide these habitat components, at least in the short-term until the majority of the canopy is lost. It is doubtful that the marten could effectively use the majority of areas where large amounts of dead and down are being salvaged or treated due to the absence of a dense conifer canopy.

The conclusion and determination relative to the effects of either of the action alternatives on this R-2 sensitive species and Forest Management Indicator Species is that these action alternatives may adversely affect individual pine marten; but are not expected to have any measurable effect on Forestwide population trends or population viability of this species; and are not likely to cause a trend to federal listing.

However it is important to note that pine marten population trends on the northern portion of the Forest are likely in a downward trend due to loss of quality habitat, and the trend will likely continue as a result of declining habitat conditions due to insect induced tree mortality of mature forest.

Peregrine Falcon. Peregrine falcon is a Forest Plan MIS and also a sensitive species that is related to unique habitat associated with cliffs. It was selected for this analysis because they occur in the analysis area and represent unique habitat. Peregrines were successfully reintroduced in the analysis area starting in the late eighties. Although not found in high densities, they can be observed by the casual user in suitable habitat on an occasional basis. Suitable nesting cliffs are available throughout many areas of the forest as well as in many portions of the analysis area, and successful nesting is occurring.

Since reintroduction, monitoring indicates that trends of wild populations of peregrine falcon have been upward on the Forest. Twelve nests were located on the forest in 2002 and at least 26 fledglings were counted (Forest Plan Monitoring Reports).

Effects on Peregrine Falcon. Under the No Action alternative there would be no change to nesting habitat. Foraging opportunities would likely be enhanced, as tree mortality would provide more open conditions for hunting.

The action alternatives could possibly cause temporary disturbance to nesting birds as a result of helicopter noise in the vicinity of nest sites during spring burning operations. Effects on foraging habitat would be negligible.

The conclusion and determination relative to the effects of either of the action alternatives on this R-2 sensitive species and Forest Management Indicator Species is that these action alternatives may adversely affect individual peregrine falcon in the short term; but are not expected to have any measurable effect on Forestwide population trends or population viability of this species; and are not likely to cause a trend to federal listing.

Northern goshawk. This discussion is based on review of the following literature and personal experience and observation: WYNDD 2002, Block et.al. 1999, Reynolds 2002, US Fish & Wildlife Service 1998 status review, sensitive species survey information collected from 1995 to present, and Forest monitoring reports. The northern goshawk is an MIS and an R-2 sensitive species that could potentially be affected by this proposal. Although population trends for this species are not known, based upon known occurrence data it appears that populations are viable and stable.

The general habitat preference for this species mature coniferous forest or mature coniferous forest mixed with aspen. Goshawk is a Forest Management Indicator Species for late successional conifer habitat. Based on recorded observations, the goshawk is uncommon on the Forest. Surveys were done in the analysis area in June and July of 2003. Twelve different call stations were run in the analysis area for goshawks and none were found. The goshawk prefers a relatively high-density canopy (>40%) over the majority of their home ranges. Based upon anecdotal evidence and observation, trends have been relatively stable in the past, however the tremendous loss of canopy in the recent past would indicate a downward trend in habitat.

Effects on Northern goshawk. With the No action alternative, the quality of goshawk habitat will decline due to the loss of the overhead canopy by insect induced tree mortality. Negligible effects to habitat quality would occur for goshawk as a result of the action alternatives, as little change in mature "live" coniferous forest would occur as a result of either alternative.

The conclusion and determination relative to the effects of either of the action alternatives on this R-2 sensitive species and Forest Management Indicator Species is that these action alternatives may adversely affect individual goshawk; but are not expected to have any measurable effect on Forestwide population trends or population viability of this species; and are not likely to cause a trend to federal listing.

Brewer's Sparrow. This discussion is based on review of the following literature and personal experience and observation: WYNDD 2002, Paige and Ritter 1999, Paige and Ritter 2000, Winward 1983, Connelly et al. 2000, Glenn et al. 2000, Draft Wyoming Sage-Grouse Conservation Plan 2003, sensitive species survey information collected from 1995 to present, and Forest monitoring reports.

The Brewer's sparrow is a Forest MIS as well as sensitive species. Based on statewide monitoring, it appears to be an abundant species of more open shrubsteepe. Distribution is much more limited in forested habitats. It was selected for this analysis because it is closely associated with the sagebrush ecosystem.

Brewer's sparrows are a fairly common summer residents on areas of suitable habitat on the Forest, and based upon past surveys populations appear stable. Sagebrush conditions in the analysis area appear to provide suitable habitat for Brewer's sparrows. No specific inventory for Brewer's sparrow has been completed throughout the project area. Monitoring over the past 2 years in the analysis area failed to observe this species, but the number of transects and locations were very limited (Faulkner & Giroir 2003).

Some patches of tall vigorous mountain sage exist, and grassland openings exist adjacent to and interspersed within the patches. Patches do not cover large expanses and are naturally quite diverse.

The limiting factor for this sagebrush obligate appears to be the availability of high quality sagebrush grassland. Maintaining quality bird habitat for Brewer's sparrow and other sagebrush obligate species depends on providing a patchwork of native plant communities of differing vegetation types, patch sizes, and seral stages interspersed throughout a landscape. An important habitat consideration is adequate type, structure, and positioning of vegetation (i.e., grass height, canopy density, etc.).

They prefer areas dominated by shrubs to areas dominated by grass, and require some dense stands of sagebrush. Small openings of short vegetation are particularly important for ground foraging species such as the Brewer's sparrow (Paige and Ritter 1999). Tall, clumped, vigorous stands are necessary for habitation by this species as their nests are usually found in sagebrush more than two feet in height (WYNDD 2001).

There are approximately 13000+ acres of sagebrush habitat for this species in the analysis area, although based on the current limits of the dataset; there are many more acres than the data show.

Habitat capability in this area is moderate at this time. Forestwide levels of suitable habitat are approximately 138,500 acres.

Probably of equal importance to young-rearing success and population recruitment is the presence of insects during the nesting/brooding period as they provide more than 90% of the diet for most bird species during this period. Insect populations in flowering broadleaf forb types are much more abundant than in pure grass types. In addition, greens provided by succulent growing forbs/legumes and seeds/fruits provided by broadleaf plants are a very important food component for many bird species yearlong.

In general, populations of Brewer's sparrow have been decreasing the past several decades in the western United States including Wyoming. The sparrow appears locally common however, based on relatively high densities found during songbird surveys in summer of 2002. As reported in the 2002 Monitoring Report, 32 birds/km were recorded in some grassland habitats on the Shoshone. Habitat conditions utilized by this species have been relatively stable over the long-term.

Effects on Brewer's Sparrow. Under the No Action alternative there will be little change in conditions related to sagebrush or Brewer's sparrows. The majority of mountain sagebrush would remain in mature seral stage without natural occurring cyclic fire intervention. Bird use would likely remain at existing levels.

Under the action alternatives, *40-70*% of the mountain sagebrush within treatment areas would be burned and revert to early grass-forb seral stage. This may decrease habitat for this species in the short term, but as the burn would provide a mosaic pattern of early seral grass/forb dominated patches (used for foraging), interspersed with late seral sagebrush dominated patches (used for nesting), habitat quality would be enhanced in the long term.

Habitat capability in this area for Brewer's sparrow changes slightly upward under the action alternatives.

The conclusion and determination relative to the effects of either of the action alternatives on this R-2 sensitive species and Forest Management Indicator Species is that these action alternatives may adversely affect individual Brewer's sparrows; but are not expected to have any measurable effect on Forestwide population trends or population viability of this species; and are not likely to cause a trend to federal listing.

Hairy Woodpecker. This discussion is based on review of the following literature and personal experience and observation: WYNDD 2002, Anderson 2002, species survey information collected from 1995 to present, and Forest monitoring reports. Hairy woodpeckers, an uncommon resident species in much of Wyoming, appear to be quite adaptable and use all types of forested habitat to some degree. Preferred habitat does not appear to be restricted. They are a low-density cavity nester that uses many tree species for nesting, however in this area they tend to frequent mature aspen stands and stands within burned areas if they are available. They show a preference for relative open stands and tend to avoid areas with high levels of dead and down material. They were selected for this analysis based on their relationship with the aspen type.

The hairy woodpecker is a relatively uncommon species throughout suitable habitat on the forest. Breeding Birds Survey routes on the Forest have recorded the species, although additional songbirds surveys in summer of 2002 and 2003 did not detect any hairy woodpeckers (Forest Plan Monitoring and Evaluation Report 2002, and Faulkner & Glenn Giroir 2003).

Studies in Yellowstone National Park and south-central Wyoming found hairy woodpecker nests mostly in aspen. Woodpeckers, including the hairy woodpecker, appear to respond to insect outbreaks behaviorally, not by increasing their reproduction. Although they eat many insects, they do not suppress beetle epidemics. Maintenance of some mature forested stands and large snags of all species at the landscape level, and maintenance of aspen stands in the long term are

necessary for providing high value habitat for the hairy woodpecker. The decline in the aspen component appears to be providing less suitable habitat for this species.

Aspen is declining across the landscape of the Forest. Mature aspen is now often encroached by conifers and does not show up well in the data. Habitat for hairy woodpecker is available in the analysis area as seen by forest service personnel, although the data shows little available. Habitat capability is low across the forest and across the analysis area due to the decline of aspen and heavy encroachment due to lack of fire.

Effects on Hairy Woodpecker. Under the No Action alternative, habitat conditions for the hairy woodpecker in the analysis area appear to be in an upward trend because of the insect infestation in the conifer stands. Stands would continue to recruit large snags, and the hairy woodpecker would respond behaviorally by concentrating more birds in the area; however, reproduction of woodpeckers is not expected to increase dramatically. In the long term, the abundance and distribution of the aspen type and seral stages, as well as the number of aspen snags would continue to decline resulting in decreasing habitat unless wildfires burn large areas.

Salvage logging, such as will occur with the action alternatives, generally has adverse effects on individuals in the short term, as it removes large snags and hinders recruitment of large snags. However, the amount of conifer snags that will be available within the North Fork analysis area outside of harvest areas will provide extremely high abundance of snags for this species. Prescribed fire on the other hand generally has positive effects on snag recruitment in the short term. Both the prescribed fire and the mechanical treatment will increase the amount of aspen snags over the very long term, as aspen stands would be regenerated.

In summary, both action alternatives would cause a slight decline in habitat value in the short term. In the long term, the abundance and distribution of the aspen type and seral stages would continue to increase resulting in enhanced habitat conditions.

The conclusion and determination relative to the effects of either of the action alternatives on this R-2 sensitive species and Forest Management Indicator Species is that these action alternatives may adversely affect individual hairy woodpecker; but are not expected to have any measurable effect on Forestwide population trends or population viability of this species; and are not likely to cause a trend to federal listing.

Ruffed and Blue Grouse. Ruffed grouse is a MIS related to aspen and it is likely that they have never been abundant on the northern portion of the Forest due to limited habitat. However, a few individuals continue to persist where even marginal habitat exists.

Blue grouse is a MIS related to general forest conditions and are common throughout the Forest in suited habitat. Blue grouse are more habitat generalists; however, as they also use riparian and deciduous areas and coniferous forest for foraging similar to the ruffed grouse, it is assumed that effects on blue grouse will be similar to those of ruffed grouse.

Ruffed grouse and blue grouse exist in and adjacent to the project area. Habitat capability for both grouse is limited and well below potential, primarily because of the lack of deciduous vegetation and the decline of aspen. Multi-storied aspen, shrub types, and riparian habitat are primary components of good grouse habitat. All these types are declining in the project area due to advancing succession. The data shows only 445 acres of aspen habitat in the analysis area with few age classes, although personal observation indicates that this figure is low. Approximately 5,481 acres of multi-storied aspen habitat exists Forestwide based on information in the Forest GIS database.

The population trend of ruffed grouse over the past several decades appears to be increasing in the state based on Wyoming Game and Fish Department (WYG&FD) data, but may be slightly

downward due to advancing succession and the related decline in aspen and other deciduous species on the Forest.

Population trends for blue grouse have been and continue to be relatively stable to slightly upward.

Effects on Ruffed and Blue Grouse. The No Action alternative would increase the vigor of aspen to a small degree as the existing aspen clones are partially released by conifer mortality. Ruffed grouse require a distribution of aspen age classes within a relatively small area, and as there would be little change to age class distribution with this alternative, populations of ruffed grouse in the immediate area are expected to continue to remain at minimal levels or decline.

The action alternatives would benefit all aspen related species in the long term, including grouse. Mechanical treatments would further enhance the release of aspen clones from conifer encroachment and where opportunities exist, aspen will be cut to regenerate stands.

Any action that enhances the amount of the aspen is beneficial to all aspen related species in the long term. This is because a mix of structure is provided on a sustainable basis over time, thus eliminating great fluctuations in available habitat and related populations.

This action may adversely impact individuals of the grouse species, however neither of the action alternatives relating to this project are expected to have any measurable effects on Forestwide population trends or the population viability of these species. Habitat capability will be increased slightly by this project.

Beaver. Beaver is a MIS related to riparian areas having an abundance of deciduous vegetation used for foraging and dam buildings. Beaver do occur in the analysis area on lower gradient streams having an abundance of deciduous vegetation, and were selected for this analysis because of this riparian relationship. In addition, bank beaver occur is some areas having less suitable habitat. Figure 25 shows riparian habitat suitable for beaver.

Beaver habitat in the analysis area is limited due to steep terrain, narrow valley bottoms, unstable volcanic substrates, and limited deciduous habitat.The most limiting factor on-forest in streams having the physical characteristics to support beaver is the lack of deciduous vegetation. Historical strategies relating to fire suppression have favored later succession tree species thus favoring non-deciduous species and discriminating against beaver.

Populations of beaver appear stable over the past decade, however numbers are well below historical levels that occurred when more suitable habitat was available.

Effects on Beaver. The No Action alternative would allow the continuation of the encroachment of conifer species into the wetland, riparian areas, and deciduous stands. Competition from such encroachment would cause a decrease in the availability of deciduous species, which is also an essential food source and building component for beaver. As deciduous vegetation is in a decline, the abundance of these types would decrease in the long term with many stands deteriorating to the point that they would be lost, unless a major disturbance event such as wildfire occurs.

The action alternatives would enhance deciduous vegetation in select areas along the North Fork corridor by reducing conifer competition and regenerating some stands of deciduous species.

The action alternatives may adversely impact individual beaver, however none of the alternatives relating to this project are expected to have any measurable effects on Forestwide population trends or the population viability of this species.

3.2.5 Wyoming Priority Bird Species

The Wyoming Partners in Flight group rated species in priority order of conservation needs. The highest priority level includes four birds that occur on the Shoshone: Brewer's sparrow, northern goshawk, peregrine falcon, and bald eagle. All of these species are included in other categories considered earlier in this section.