breeding, adult frogs can be found feeding in upland habitats of grasslands, meadows, and pastures adjacent to breeding areas. Adult frogs are highly mobile, moving at night or when vegetation is wet (USDA-Forest Service 1996). They have been found up to two miles from water (Smith 2003). Northern leopard frogs overwinter submerged in permanent water that does not freeze solid (USDA-Forest Service 1996, 2000a, Smith 2003).

Risk factors identified by Smith (2003) include inadequate regulatory protection of smaller (< 5ha) seasonal and semi-permanent ponds, introduced predatory fish, lack of protection at overwintering sites, water quality degradation due to chemicals, loss of migratory pathways, introduced diseases, and road-related mortality.

### 4-4.1.1 Direct and Indirect Effects

The direct and indirect effects to the leopard frog resulting from management activities are described in USDA-Forest Service (1996, 2000a). Eggs, larval, and adult leopard frogs may be killed or injured by variety of activities such as on/off-road vehicle traffic associated with recreation or in the course of vegetation management treatments (timber harvest, prescribed burning, wildfire suppression, noxious-weed treatment). Livestock foraging or watering may also kill or injure eggs, larval, or adult frogs. Implementation of standards and guidelines, watershed conservation practices, and State best-management practices (BMPs) emphasize the protection of riparian and aquatic habitats but would not completely avoid the direct effects to this species.

Indirect effects occur to this species in a variety of ways. Management activities may displace or compact soils and remove or disturb ground litter. Compaction by any activity can reduce infiltration capacity. Stream crossings can damage channel stability and increase sediment input. Disposal of slash can result in sediment input from pile/slash burning or fireline construction. Fire prevention and suppression activities can result in ground disturbance within riparian areas and increase the potential for sediment input into aquatic habitat. Water quality may be affected by chemical applications or contaminated surface water runoff.

Indirect effects to the leopard frog are mitigated through a wide variety of standards and guidelines, watershed conservation practices and State BMPs. These effects are analyzed in detail in the Riparian and Wetlands Ecosystems and the Aquatic Ecosystems effects analysis in the FEIS and are summarized below.

Effects to upland and aquatic habitat related to soil disturbance and surface water runoff are mitigated across all alternatives. The amount of soil disturbance and soil compaction is minimized by Standards 1103, 1105, 1106, and Guideline 1104. The adverse effect of increased surface water runoff is reduced by Standards 1112, 1113, 1114, and 1116. Guideline 1115 directs the use of vegetative buffer strips to mitigate sediment input into aquatic habitat. Guideline 4111 locates slash piles scheduled for burning out of meadows that contribute to Waters of the United States.

All alternatives contain direction to avoid the effects of vehicle traffic on riparian and aquatic habitat. Objective 105 strives to prohibit motorized vehicles in wetlands, wet meadows, and riparian areas. Guideline 4102 protects streams, lakes, and adjacent riparian areas from wildfire-suppression efforts, including the use of earth-moving equipment in stream channels. Guideline

9107 prohibits land vehicles from entering perennial steams where resource damage would occur. Guideline 9108 restricts vehicle traffic to roads and trails in riparian areas.

The effects of pollutants on water quality are mitigated across the range of alternatives to maintain wetland habitat. Standards 1211, 1212, and 1213 require the placement of new chemical and pathogenic pollutants where they will not reach surface or groundwater; require the application of runoff controls to disconnect new pollutant sources from surface-and-ground water; and require the application of chemicals using methods to minimize the risk of entry to surface-and-ground water, respectively. In all alternatives, Guidelines 4304 and 4305 minimize the impact from chemical treatment applications through selective application at the lowest effective rates. Standard 4308 requires the use of buffers around water sources, lakes, wetlands, and streams to keep concentrations of chemical agents in the water well below those harmful to drinking, irrigation, aquatic life, and non-target vegetation. The treatment of individual plants with aquatic-labeled chemical agents may occur in buffers.

Numerous objectives, standards, and guidelines under all alternatives strive to maintain or enhance the quality or quantity of existing riparian communities, wetlands, and wet-meadows areas. Objective 104 strives to maintain or enhance watershed conditions to foster favorable soil relationships and water quality. Objectives 107, 108, and 215 are all designed to restore and enhance historic wet areas (including wetlands, wet-meadows, and riparian communities) and to reintroduce beavers back into the ecosystem. Standards 1301, 1302, 1304, and 1306 and Guideline 1303 would help protect these areas and maintain their health and diversity from a host of various management and recreational activities. Standard 1305 locates camping sites for contractual purposes such that channel and riparian areas are not impacted. Guideline 5301 discourages dispersed camping within 100 feet of lakes and streams, with exceptions.

Objective 215 (Alternatives 1, 2, and 4) strives to implement riparian rehabilitation projects for at least three stream reaches. Under Alternatives 3 and 6, restoration goals would be increased to rehabilitate at least five stream reaches. The re-introduction of beavers back into the Black Hills ecosystem (Objective 215d, all alternatives) is an important component of restoration goals, as their dam complexes provide diverse habitats for breeding, tadpole development, and overwintering.

Standard 1505 and Guidelines 1506, 1507, and 1508 minimize disturbance to riparian areas by mineral activities and by requiring monitoring of mitigation measures to ensure effectiveness. The discharge of new pollutant sources is mitigated by Standards 1211, 1212, and 1213. Standard 1305 requires locating camping sites for contractual purposes (e.g. mining, logging, etc.) such that channel and riparian areas are not impacted.

Improper livestock grazing can have numerous adverse effects on riparian and wetland ecosystems such as water quality degradation and over utilization of riparian vegetation (USDA-Forest Service 1996). The level of livestock use will remain constant across the range of alternatives (Objective 301a; 128,000 Animal Unit Months). Under Alternatives 3 and 6, the Forest-wide guideline (2505) on residual levels (the remaining height of key plant species after livestock grazing) is changed to a standard and modified so that residual levels in riparian and wetland areas would have to be prescribed in allotment management plans (AMPs) or AOI letters. Objective 200-03, under Alternatives 3 and 4 protects aquatic and shoreline vegetation

around 50 ponds or water catchments over the life of the Plan. In Alternative 6, this objective protects aquatic, shoreline and upland vegetation around ponds or water catchments containing leopard frogs. Standard 1304 opportunistically relocates or implements mitigation measures for water tanks or water catchments located in the Water Influence Zone. Measures to maintain proper use or residual levels of vegetative cover promote bank stability adjacent to aquatic habitats and maintain the filtering function of riparian areas adjacent to water (Guidelines 2505 and 2506). Guideline 2505c limits the utilization of willows and other deciduous vegetation to 40 percent. This guideline becomes a standard in Alternatives 3 and 6 and is treated as a standard in Alternatives 2 and 4. Guideline 2505d removes livestock from the grazing unit or allotment when further utilization exceeds proper use or residual levels. Impacts from livestock grazing in fenced riparian pastures are mitigated through Guidelines 2507 and 2508.

Stream connectivity is an important aspect of stream networks because it allows for the transport of sediment through the system and the passage of fish and other aquatic organisms to maintain their distribution. Existing barriers, such as dams, culverts, in-stream habitat structures that may impede the passage of aquatic organisms will persist on NFS and non-NFS lands. Natural factors, such as drought, will continue to fragment habitat on a variable basis and the underlying geology disrupts stream connectivity at the “loss zone” within or surrounding the Forest. None of the Alternatives would further fragment stream habitat above existing conditions because Standard 1203 requires that all stream crossings and in-stream structures be designed and constructed to provide for the passage of flow and sediment and to allow free movement of resident aquatic life. All alternatives have the potential to improve stream connectivity by removing existing in-stream barriers as part of general road system improvements or as connected actions to vegetation management treatments. The level of road construction, reconstruction, and road and two-track obliteration (Objective 309) is the same for all alternatives. Management emphasis to create conditions favorable for beaver may result in additional beaver dams.

To mitigate the impacts from livestock grazing, Objective 200-03 (Alternatives 3, 4, and 6) would help enhance breeding habitat provided by current and future stock ponds and other catchment areas by maintaining vegetative communities that provide protective cover along shorelines. None of the alternatives propose an increase in livestock grazing. Standard 1304 opportunistically relocates or implements mitigation measures for water tanks or water catchments located in the Water Influence Zone.

In addition to breeding, tadpole, and overwintering habitats, leopard frogs require nearby diverse and productive upland foraging areas. Several standards and guidelines recommend managing for diverse, high quality riparian, meadow, and shrub communities. Guidelines 2505, 2507, and 2508 (Alternative 1) manage grazing in riparian areas to meet residual cover objectives important in maintaining productive foraging areas and in providing protective cover from livestock trampling and predation. Under Alternatives 2, 3, 4 and 6, these guidelines would be strengthened to standards.

Introduced diseases are recognized as a potential cause of amphibian declines, though the sources of these diseases are not well understood (Smith 2003). Introductions species such as bullfrogs or other amphibians could introduce exotic diseases. Diseases could be introduced to Black Hills ponds through other means such as by fishermen, tourists and investigators surveying

and monitoring northern leopard frogs (Smith 2003). None of the alternatives propose changes that would reduce the risk to leopard frogs from potential vectors of disease. Public education on exotic species would continue in all alternatives.

Although leopard frogs are considered common in suitable habitat, gaps do exist in their distribution (USDA-Forest Service 2000a; Smith 2003). Under all alternatives, suitable breeding, development, foraging, and overwintering habitats would be maintained or enhanced. There would also likely be an increase in extent of these habitats, if riparian and aquatic objectives are achieved in Alternatives 3 and 6.

### 4-4.1.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Drought may affect the amount of habitat available for frog reproduction. Ponds or water bodies that dry up after larval frogs have metamorphed into adults may have little impact compared to ponds that go dry during the breeding season, when tadpoles and larval frogs would be killed. Ponds that dry late in the season or infrequently during drought conditions may benefit the leopard frog by removing aquatic predators that require permanent water.

In the Black Hills, it is believed this species has been reduced from its historical abundance due to the reduced number of beaver and the habitat associated with their dams. Efforts to restore beaver would have an additive benefit to the frog through the creation of additional suitable habitat. The ecological benefits associated with increased beaver populations may be decades in the future because beaver populations will be dependant on riparian and hardwood restoration efforts. Efforts to restore beaver may be constrained due to damage complaints on NFS and non-NFS lands that result in the removal of “problem” beaver.

Private inholdings occur frequently within riparian areas. These private lands provide suitable habitat, but conditions may have been altered by private land management activities, such as the removal of beaver dams or draining to convert to drier site conditions for subsequent haying. The loss of beaver-created habitat may be partially offset by the creation of artificial impoundments for livestock water, recreational or other purposes. Fencing of stock ponds, protection of seeps/springs, and other efforts to improve the quality or quantity of riparian/wetland habitats would be a positive addition to leopard frog habitat that may have been degraded on NFS or non-NFS lands.

Non-native predatory fish have been identified as a risk factor to leopard frog persistence. None of the alternatives change fish stocking numbers, species or frequency because this is a State role. Indirectly, habitat enhancement efforts may promote sustainable or improved recreational fisheries which may have a detrimental effect on the frog. Efforts to enhance lake/pond habitat, such as dredging, to improve recreational fishing may remove nearshore vegetation that serves as protective cover for frogs to escape predation and result in more favorable conditions (water

depth, temperature, etc) that sustain predatory fish. Many of the artificially constructed ponds on the Forest date back to the Civilian Conservation Corps era (1930-40s) and have become shallower and more vegetated over time providing favorable conditions for the leopard frog unless they have completed filled with sediment, where their value for breeding habitat is lost.

Alternatives 3 and 6 would have the greatest cumulative benefit to leopard frogs because they target the most stream reach restoration. Under all alternatives, suitable breeding, development, foraging, and overwintering habitats would be maintained or enhanced on the Forest.

### 4-4.1.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** This species is common in suitable habitat on the Forest. Implementation of standards, guidelines, watershed conservation practices, and BMPs would maintain and protect aquatic, riparian and upslope areas in a condition and quantity that continues to support well-distributed, reproductive populations. The species is likely to persist on the Forest over the next 50 years. The above determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Riparian conditions will move towards riparian restoration objectives. The time required to reach this objectives is dependent on funding and other factors. As a result, it may take two or more decades to achieve these objectives.

3. The distribution of stocked, non-native, predator fish will remain similar to current conditions.

4. The vectors for the transmittal of indroduced diseases will remain similar to current conditions.

## 4-5. SPECIES DESCRIPTIONS AND EFFECTS ANALYSIS – REPTILES

This section contains the distribution and status, natural history and habitat use, direct and indirect effects, cumulative effects, resource conservation measures, and determination and rationale for Region 2 sensitive reptiles.

The indirect and cumulative effects analysis for species persistence is bounded in time as the next 50 years. This temporal scale is based on: a) the planning horizon (usually 50 years for a Forest plan); b) the biology of the species (e.g., generation time, response time to changed conditions, recolonization capability); and c) the time needed for the overall ecosystem to respond to proposed management (Liggett et al. 2003).

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). This area was

chosen because it encompasses similar ecosystem components and species that occur on the Black Hills National Forest. A larger area would include the surrounding plains, which includes a vastly different suite of species and ecosystem components.

## 4-5.1. Black Hills Redbelly Snake

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of Black Hills redbelly snake distribution and natural history and is incorporated here by reference. Additional information from a recent conservation assessment of the Black Hills redbelly snake by Smith and Stephens (2003) has also been integrated.

The redbelly snake is a nocturnal and secretive snake found in moist sites from the western foothills, the limestone plateau, and the central core of the Black Hills (Smith and Stephens 2003). Sites where the snake has been observed range in elevation from 4,700 to 6,400 feet (Peterson 1974). The Black Hills subspecies of the redbelly snake is an isolated population with the nearest population of redbelly snakes about 300 miles east near Aberdeen, South Dakota (USDA-Forest Service 2000b). Biological expert interviews (USDA-Forest Service 2000b) suggest that the redbelly snake is reasonably common in the Black Hills. Although the redbelly snake does not appear to be in danger of extirpation, the population in the Black Hills is an isolated subspecies and endemic to the Black Hills; therefore, its persistence should be considered in management decisions (USDA-Forest Service 2000b). Little demographic and population trend data are available specific to the Black Hills population (Smith and Stephens 2003). This subspecies is considered one of the most poorly understood snakes of North America (Bartlett and Tennant 2000).

Several den sites have been found in the Black Hills with hibernacula located within rock fissures (USDA-Forest Service 2000b). There are 36 records of this species in the Forest FAUNA database (USDA-Forest Service 2004g). The observations are located across the central and northern portions of the Black Hills. The southern portion of the Black Hills is drier, which may affect distribution.

Black Hills redbelly snakes are associated with mesic sites such as wetlands, riparian areas, and wet meadows (USDA-Forest Service 2000b). The most serious risk to redbelly snakes populations may be the loss of mesic habitats (Smith and Stephens 2003). Suitable environments for redbelly snakes are thought to be abundant and broadly distributed across the Black Hills (USDA-Forest Service 2000b). The northern Black Hills, being generally moister and more fire-resistant than the rest of the Forest, likely provides more habitat than other districts of the Forest (USDA-Forest Service 2000b). Stumps and downed woody material are important in maintaining moist conditions; as roots of stumps decay, they provide cover (USDA-Forest Service 2000b, Smith and Stephans 2003).

There is some indication that redbelly snakes may feed on snails (and on the genus *Oreohelix*, preferentially), implying that habitat management aimed at snails may also benefit the Black Hills redbelly snake (USDA Forest Service 2000b). In general, redbelly snakes share similar dentition characteristics with other snakes that feed on slugs, snails, earthworms, and other soft-bodied invertebrates (Smith and Stephens 2003).

### 4-5.1.1 Direct and Indirect Effects

In general, all alternatives strive to enhance existing riparian communities, wetlands, and wet-meadow areas. These areas are important in providing habitat for the redbelly snake and invertebrate prey. Under Alternatives 1, 2, 4 and 6, Objective 214 targets restoration of 500 acres of riparian-shrub habitats. Under Alternative 3, this objective would double restoration goals to 1,000 acres of riparian-shrub habitat. All alternatives would disperse restoration treatments throughout the Forest. Objectives 215a, b, c, and d (all alternatives) are designed to restore and enhance historic wet areas (including wetlands, wet-meadows, and riparian communities) and to reintroduce beavers back into the ecosystem. These, along with Objective 213 (all alternatives), would restore and expand areas of suitable habitat for the redbelly snake by improving vegetative condition, structure, and diversity.

Aspen, birch, oak, and other hardwood communities likely provide additional habitat. Objective 201 (Alternatives 1, 2, and 4) targets the restoration of existing hardwood community acreage to increase levels by 10 percent over 1995 levels on the Forest. Under Alternatives 3 and 6, the total acreage of potential habitat provided by aspen/birch and oak and other hardwood communities would roughly double and would be dispersed throughout the Forest. Hardwood treatments may result in short-term disturbance to snakes or their habitats, but would provide better quality habitat in the long-term (e.g., moist aspen sites vs. dry pine sites). The total amount of potential hardwood habitat would be highest under Alternatives 3 and 6, second highest under Alternative 4, with smaller acreage under Alternatives 1 and 2. For more detailed analysis of hardwood ecosystems, see the Forested Ecosystem section in the FEIS (Section3-2.1.3).

Objective 212, Guideline 2307, and Standard 2308a offer guidance designed to provide downed logs and woody debris left after harvest operations. Standard 2308 increases the amount of downed logs in spruce communities under Alternatives 3 and 6. Downed logs and woody debris are crucial in maintaining moist soil conditions, habitat for prey species, and providing refugia for redbelly snakes from potential predators.

Standard 3103 (all alternatives) provides protection for known snail colonies, a potentially important food source for the Black Hills redbelly snake. For more information on effects to snails, see the discussion for *Oreohelix strigosa cooperi*. Standard 3116 (Alternatives 2, 4 and 6) is designed to avoid new barriers such as new roads between redbelly snake hibernacula and wet areas. This is designed to reduce barriers to snake movement and to reduce the risk of snakes being killed by passing vehicles.

Black Hills redbelly snakes will likely persist across the Forest over the next 50 years under all alternatives. This conclusion assumes that management activities will move conditions towards the riparian and hardwood objectives, and that standards and guidelines will be met.

### 4-5.1.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing

condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Management of national and state parks adjacent to the Forest would have an unknown effect on Black Hills redbelly snake populations. It is assumed that federal and state lands offer suitable habitat for redbelly snakes; however, information on location, abundance, and distribution is not available. National parks and monuments typically use natural processes and prescribed fire to manage vegetation, similar to disturbances with which this species evolved. National parks and monuments likely contribute to the conservation of this species and compliment the conservation on the Forest.

Privately owned forest lands within the Forest boundary may also provide suitable habitat, but resource management by companies and private citizens depends on a number of factors (e.g., desired goals, market prices, development potential) making it difficult to predict future trends in private forest structure and diversity. Potential suitable habitat is expected to occur on private lands across the Black Hills. Continued urban development in the Black Hills will likely continue to affect habitat, including riparian areas, thereby increasing the importance of habitat on NFS lands. However, given the conservation measures designed into the alternatives for hardwoods and riparian areas on NFS lands and the efforts at national parks and monuments, this species is likely to persist in the Black Hills over the next 50 years.

Alternatives 3 and 6 would have the greatest cumulative benefit to redbelly snakes because they target the most stream reach and riparian restoration and hardwood restoration. The total amount of potential hardwood habitat would be highest under Alternatives 3 and 6, second highest under Alternative 4, with smaller acreage under Alternatives 1 and 2. Standard 2308 in Alternatives 3 and 6 also increases the amount of downed logs in spruce communities.

### 4-5.1.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Implementation of Forest-wide objectives, standards, and guidelines would conserve and enhance suitable Black Hills redbelly snake habitats and the habitats of important invertebrate prey species. Although more needs to be done to clarify the species' distribution and abundance in the Black Hills, it appears to be reasonably common and widely distributed across the Forest (USDA-Forest Service 2000b). Riparian and hardwood areas would be maintained or enhanced, providing continued habitat for the species. This determination is based on the following assumptions:

1. Management activities will move conditions towards the riparian and hardwood objectives.

2. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

# 4-6. SPECIES DESCRIPTIONS AND EFFECTS ANALYSIS - BIRDS

This section contains the distribution and status, natural history, direct and indirect effects, cumulative effects, resource conservation measures, and determination and rationale for Region 2 sensitive birds.

The indirect and cumulative effects analysis for species persistence is bounded in time as the next 50 years. This temporal scale is based on: a) the planning horizon (usually 50 years for a Forest plan); b) the biology of the species (e.g., generation time, response time to changed conditions, recolonization capability); and c) the time needed for the overall ecosystem to respond to proposed management (Liggett et al. 2003).

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). This area was chosen because it encompasses similar ecosystem components and species that occur on the Black Hills National Forest. A larger area would include the surrounding plains, which includes a vastly different suite of species and ecosystem components.

## 4-6.1. American Three-Toed Woodpecker

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of distribution and life history for the three-toed woodpecker, and is incorporated here by reference.

The main range of the three-toed woodpecker extends through the Rocky Mountains and laterally across Canada to northern New England (Leonard 2001). The Black Hills population is isolated from the main range by nearly 200 miles. In South Dakota, this woodpecker is considered a rare yearlong resident limited to the higher elevations of the Black Hills (South Dakota Ornithologist's Union 1991). Breeding has been documented in the Black Hills of South Dakota but not in Wyoming (Peterson 1995). The three-toed woodpecker may also be found at lower elevations, especially in winter (South Dakota Ornithologist's Union 1991).

The three-toed woodpecker population trend has been relatively stable in both the northern Rocky Mountains and Badlands/Prairies physiographic regions. However, BBS data suggests there may be isolated local declines (Sauer et al. 2001).

In a baseline study of three-toed woodpecker populations in the Black Hills, Mohren (2002) estimated that approximately 320-440 birds occurred here in 2000-2001, with an average Forest-wide density of 1 bird/3088 acres (0.08 birds/$km^2$). The estimate applies across all habitat types on the Forest, including forest types that the species does not typically inhabit (e.g., pure ponderosa pine). According to Mohren (2002), the Forest-wide density estimate was similar to what has been recorded in other unburned habitats across the species range.

Three-toed woodpeckers are closely tied to insect outbreaks, and are adapted to this highly variable and unpredictable resource (Leonard 2001). Insect outbreaks follow disturbances, particularly fire, but also diseases, flooding, and windthrow. Range-wide, the three-toed woodpecker uses recent burns that have high levels of wood-boring insects. Woodpecker

densities have been much higher in recent burned areas than in unburned areas (Anderson 2003). However, Panjabi (2001, 2003, 2004) has not found them in ponderosa-pine burns in the Black Hills. Burned spruce likely harbors the species, but this has not been verified because little spruce has burned in the Black Hills during recent years, and none of it has fallen in the stratified-random design that the Forest uses to monitor birds (USDA-Forest Service 2004b). Three-toed woodpeckers are associated with burned spruce in other portions of its range, and it is assumed that they would use it in the Black Hills as well.

Late successional spruce-fir forest represents the core breeding and feeding habitat for the species (Wiggins 2004). To date, monitoring results show areas in or adjacent to mature white spruce stands harbor the highest three-toed woodpecker densities in the Black Hills. In 2002 and 2003, densities in spruce habitats were 1 bird/137 acres and 1 bird/68 acres (1.80birds/$km^2$ and 3.64 birds/$km^2$), respectively. These figures are 23 to 45 times higher than Mohren's (2002) Forest-wide average. Birds were also found in late-successional pine habitats and riparian habitats but in much lower densities than in white spruce. Also, spruce trees were usually present in those other habitat types where the woodpeckers occurred.

Spruce habitat is naturally patchy and of low abundance on the Black Hills. White spruce occurs at high elevations, on north aspects, and in cool canyon bottoms of the Forest (USDA-Forest Service 1996). Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills, generally at the expense of quaking aspen (Parrish et al. 1996). Spruce was estimated to have comprised about 15,000 acres of the pre-1900 forested landbase (USDA-Forest Service 1996, p. III-139). In 1995, the spruce acreage was estimated at 21,737 acres on the Forest (USDA-Forest Service 1996). The white-spruce cover type now occurs on 25,000 acres of the Forest. Some of the increase may be attributable to more accurate mapping techniques and recent inventories. Approximately 90 percent of the spruce on the Forest is in mature or late-successional condition (structural stages 4 and 5) and likely provides high quality habitat for three-toed woodpeckers. For more information on white spruce in the Black Hills, refer to the White Spruce Ecosystems section of this document.

Three-toed woodpeckers nest mainly in snags but will use live trees, especially those with heart rot. Species of nest trees vary and include hardwoods as well as conifers. Diameters of nest trees range from nine to 17 inches (Anderson 2003). Large diameter trees typically occur adjacent to the nest tree (Anderson 2003). Optimal habitat includes areas with 42-to-52 snags per 100 acres, occurring in clumps (Nicholoff 2003). The most important snags are 12-to-16 inches dbh, 20-to-40 feet tall, and have bark still present (Nicholoff 2003).

### 4-6.1.1 Direct and Indirect Effects

Under Alternatives 1, 2, and 4, Objective 204 calls for managing and conserving white spruce as well as lodgepole pine, limber pine, and Douglas fir. Objective 200-01 was established under Alternative 3 to provide for late-successional stages within white spruce. In Alternative 3, Objective 200-01 favors hardwood restoration where spruce has encroached upon hardwoods and favors spruce where it is encroaching into pine stands, especially where it improves connectivity between spruce stands. Spruce still may be treated where it occurs within 300 feet of buildings to provide for defensible space for fires. In Alternative 6, Objective 200-01 manages

for 20,000 acres of spruce, allowing treatment of spruce within 200 feet of buildings (for fire), where spruce has encroached into hardwoods, and for emphasis species management.

Spruce and aspen are both recognized as a valuable component of diversity in the Black Hills. Therefore, proposed objectives seek to obtain a balance between these important resources. Objective 201 conserves and restores hardwoods, including aspen. Spruce may be removed in some areas to meet this objective in Alternatives 3 and 6. Several emphasis species are likely to benefit from treating spruce to encourage aspen, including beaver, ruffed grouse, leopard frogs (through beaver ponds), and willow species.

Guideline 2205 specifically addresses treatment requirements for Objective 201. For Alternatives 1, 2, and 4, no more than 10 overstory conifers per acre are to be left on site following treatment. Under Alternatives 3 and 6, all conifers would be removed, and this guideline would be made a standard.

Spruce habitat has likely increased since historic times (Parrish et al. 1996) and has continued to increase some since 1995. The effects to the spruce ecosystem are discussed in the Forested Ecosystem section in the FEIS and are summarized here.

Alternatives 3 and 6 would have the largest direct impact, as more spruce would be removed under the more aggressive approaches to hardwood and riparian restoration. These losses, however, are expected to be balanced by the preference of spruce over ponderosa pine in other areas in Alternative 3.

Alternative 6 manages for less spruce than currently exists in an attempt to balance the need for treating areas where spruce has encroached into hardwoods. Such treatments are expected to affect individual three-toed woodpeckers. However, spruce habitat will be maintained at levels similar to 1995 estimates, which presumably supported reproducing populations since they continue to occur on the Forest.

Alternatives 1, 2, and 4 would also directly remove spruce but to a lesser extent. Overall, however, the amount of spruce (about 25,000 acres) is not expected to change into the future under these alternatives, because only marginal changes at the edges of existing spruce stands are expected. These changes would result from direct management to benefit hardwoods or reduce fire hazard around buildings or from the natural encroachment of spruce in aspen stands.

White spruce communities are present on the existing Upper Pine Creek RNA. This RNA will continue to exist under all alternatives. Two candidate RNAs also contain spruce communities. The Canyon City candidate RNA could be established under Alternatives 3 or 4. The majority of the site is ponderosa-pine forest with white-spruce communities occurring along Rapid Creek and on the lower slopes of east aspects. North Fork Castle Creek candidate RNA would be established under Alternatives 4 and 6. White spruce is found at the toe of slopes, along drainages, and on north aspects.

The direct effect of the establishment of an RNA on spruce would be conservation. However, RNAs would continue to be influenced by natural processes, such as fire, insects, and diseases. In the absence of management activities for fire, spruce may increase in density and canopy cover in these RNAs. Correspondingly, the likelihood of a stand-replacing fire in white-spruce

stands would increase. Likewise, some areas may succeed to white spruce in the absence of fire or management activities. Impacted areas would be current aspen stands or ponderosa-pine sites favorable to spruce regeneration (e.g., higher elevations, north aspects, and canyon bottoms). In particular, spruce could encroach into aspen stands in the candidate North Fork Castle Creek RNA. All of these events would increase habitat for the three-toed woodpecker.

Objective 10-01 strives for reduced fire hazards on the Forest. Alternative 6 would manage for a low-to-moderate fire hazard on 50-75 percent of the area within the WUI. Alternative 6 would manage the remainder of the Forest for 50 percent of the area in low-to-moderate fire hazard. In Alternative 3, Objective 10-01 manages for a low-to-moderate fire hazard on 50 percent of the area within the WUI.

Objective 10-01 offers sufficient flexibility to meet the spruce objectives (Objective 204) as well. However, some removal of spruce could occur. Alternatives 3 and 6 would have the most potential to impact the three-toed woodpecker, as more spruce would be removed under the more aggressive approaches to fire-hazard reduction. These losses are expected to be balanced by the preference of spruce over ponderosa pine (Objective 204) in Alternative 3. Alternatives 1, 2, and 4 may also directly remove spruce but to a lesser extent. Overall, the amount of spruce is not expected to change into the future under alternatives 1, 2, 3, and 4 because only marginal changes at the edges of existing spruce stands are expected. These changes would result from direct management to reduce fire hazard around buildings.

In the event that wildfires would occur, Objective 11-03 would guide value recovery (i.e., salvage logging) under Alternatives 3, 4, and 6. No value recovery would occur under Alternative 4; this would provide maximum potential habitat benefit to the three-toed woodpecker, as no habitat would be altered. In Alternatives 3 and 6, dead trees would be available for value recovery, excepting 50 percent of the recent (zero-to-five years) stand-replacing fire acreage Forest-wide, up to 10,000 acres unsalvaged in any given five-year period. As burns age beyond five years, new burns would be added to the unsalvaged quota.

The amount and age of the unsalvaged areas were adopted from and are consistent with the three-toed woodpecker recommendations provided in the Wyoming Bird Conservation Plan (Nicholoff 2003). The Conservation plan recommendations were intended to provide a continual supply of three-toed woodpecker habitat over at least one percent of the landscape at any given time. The assumption is that providing recently-burned habitat over space and time would ensure long-term persistence of the species across the landscape.

Due to the low abundance of spruce across the Forest and the inherent low fire frequency associated with it, it is unlikely that most burns would occur in spruce. Therefore, it is not realistic to expect that burned spruce would be a substantial component of the Black Hills landscape or that the full 10,000 acres of unsalvaged timber would be in spruce. A more appropriate expectation would be that up to 250 acres of burned spruce would be unavailable for salvage since this is equal to one percent of the total spruce acreage.

Objective 211, Standard 2301c-e and Standard 2302 would be applied to snag management in post-fire spruce habitat under Alternatives 1 and 2. They would also be used to guide snag management in all alternatives if spruce bark beetle infestations occur, and in general forest

conditions (i.e., within live forests). The specific language varies by alternative and must be tracked in the appropriate context.

To summarize the snag language, minimum spruce-snag densities vary from 1.08-to-six snags per acre across the alternatives. In all alternatives, snags densities should be met across relatively large areas (e.g., watersheds or project areas), not necessarily every acre. This is expected to produce some areas with higher snag densities and other areas with lower densities. This suite of direction has some risk in ensuring adequate habitat for three-toed woodpeckers after fire salvage in Alternatives 1 and 2 or after insect salvage in any alternative. This is because three-toed woodpecker densities have been shown to be significantly lower in salvaged areas than unsalvaged areas, and presumably unsalvaged areas would have much higher snag densities and sizes than what is prescribed in Objective 211 and its enforcing standards.

The snag densities associated with Objective 211 are in closer alignment with what is necessary for woodpeckers in unburned forest. Nicholoff (2003) suggests that snag densities should average between 42 and 52 snags per 100 acres that occur in clumps. This suggests that Alternative 1, which specifies only 1.08 snags per acre, would have the highest risk of not providing adequate snags for three-toed woodpeckers across unburned landscapes. Alternatives 2 and 4 would likely provide the least risk since an average of six snags is specifically called for in spruce habitats. Alternatives 3 and 6, which call for three snags per acre, would have slightly more risk than Alternatives 2 and 4. However, the risk associated with any of the alternatives except Alternative 1 would be relatively small because some areas would have snag densities that exceed the prescribed average.

Each of the alternatives varies in its snag size requirements and could have some effect on three-toed woodpeckers. Anderson (2003) reported that nest snags range between nine and 17 inches. Mohren (2002) reported small snags (averaging nine inches dbh) were associated most often with three-toed woodpeckers in the Black Hills, even though larger snags were available. Nicholoff (2003) suggests that snags 12 to 16 inches dbh are most important. All alternatives but Alternative 1 specify that all snags counting toward density objectives would be at least nine inches dbh, and further promote that some would be at least 14 (Alternatives 3 and 6) or 20 inches (Alternatives 2 and 4). Based on these parameters, Alternatives 2 and 4 provide the most assurance that adequate snag sizes exist followed by Alternatives 3 and 6. Alternative 1 has no large size snag requirements and provides the least amount of assurance that adequate snag sizes would occur for the three-toed woodpecker.

In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

### 4-6.1.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Wind Cave National Park and Jewel Cave National Monument likely contain little spruce habitat because they are located in the southern Black Hills where spruce is sparse or absent. Spruce does occur in Custer State Park, mostly at the north end near recreation sites. Management in Custer State Park will likely contribute to the conservation of this species.

Privately owned lands within and adjacent to the Forest boundary may also provide suitable breeding and winter habitat for the three-toed woodpecker. Resource management and conservation by private citizens and companies depends on a number of factors (e.g., desired goals, market prices, development potential) making it difficult to predict future trends in private forest structure and diversity. Landowners may treat forests for lumber or to reduce fire hazards, which could reduce habitat for three-toed woodpeckers if mature spruce stands are treated. It is assumed that urban development will continue on private lands. This will likely increase the importance of habitat located on NFS lands.

Alternative 4 is likely to have the least cumulative effects because it has a higher snag density requirement and allows no value recovery of dead trees following a wildfire. Alternatives 3 and 6 is likely to have more cumulative effects than Alternative 4 because they allow some salvage of dead trees following a wildfire (Objective 11-03). Alternative 6 is likely to have more cummulative impacts than Alternative 3 because it allows spruce to decrease from 25,000 acres to 20,000 acres. Alternative 2 is expected to have more cumulative effects than Alternatives 3 and 6 because it does not include direction for maintaining dead trees following a wildfire and may result in less structural stage 4C and 5. Alternative 1 could result in the most additive effects from management activities on the Forest due to the lower snag density standard, the allowance for habitat capability to decline continuously (Guideline 3201), and the lack of direction on post-fire salvage (11-03).

### 4-6.1.3 Determination and Rationale

**May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area.** Three-toed woodpeckers could be affected by fire-and-insect hazard reduction activities, salvage operations, other snag management, and the availability of mature spruce forest. Alternative 4 would consistently have the lightest effects to three-toed woodpeckers regarding these items. The remaining alternatives contain a mix in relative effects. However, all alternatives would likely allow the three-toed woodpecker to persist on the Forest over the next 50 years, mainly because most mature spruce stands would remain intact to support three-toed woodpeckers. This determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the spruce objectives for each alternative.

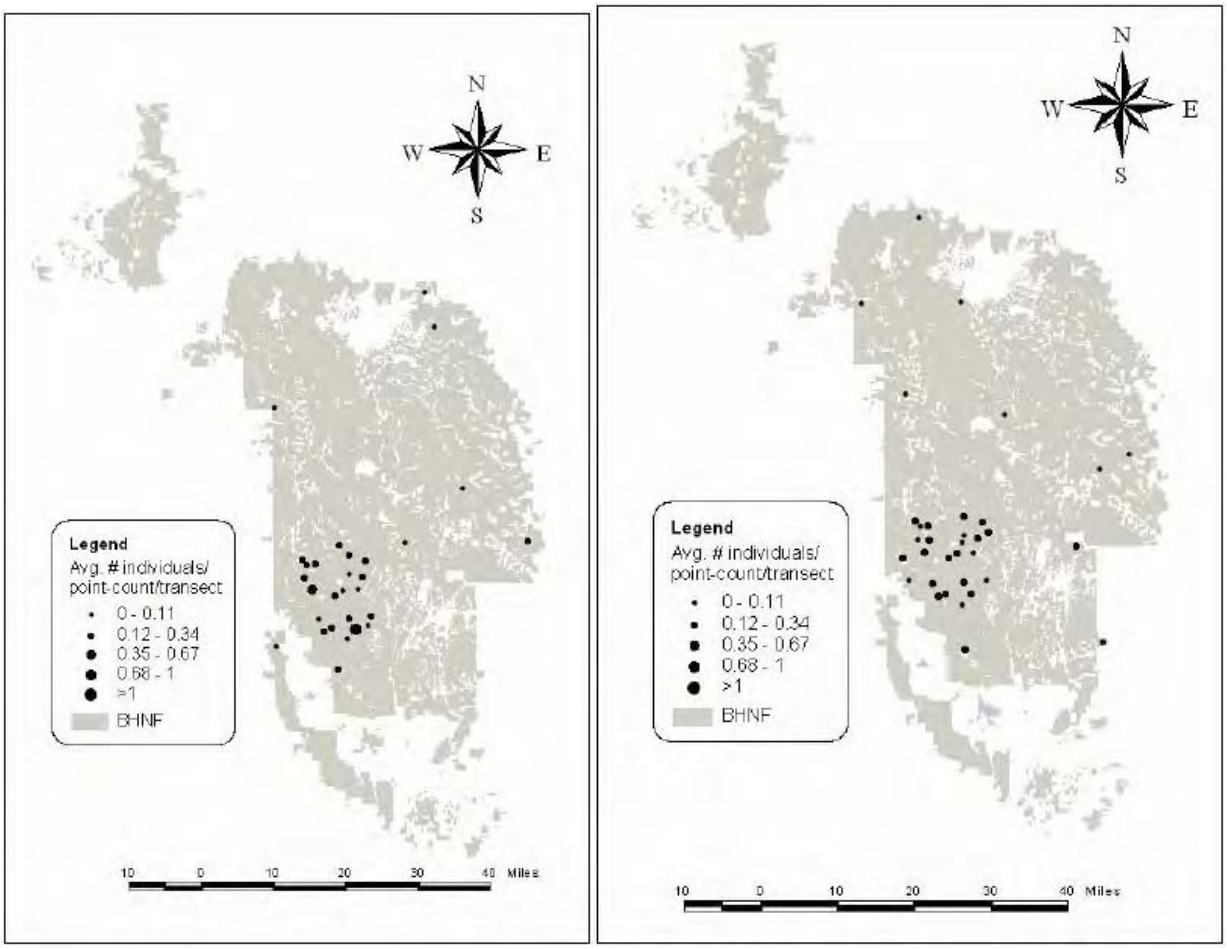
## 4-6.2. Black-Backed Woodpecker

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of distribution and life history for the black-backed woodpecker and is incorporated here by reference.

The main range of the black-backed woodpecker is in the northern Rocky Mountains and across Canada (Dixon and Saab 2000). The Black Hills population is isolated from the main range by approximately 200 miles. In South Dakota, this woodpecker is known only in the Black Hills, where it is considered an uncommon yearlong resident (South Dakota Ornithologist's Union 1991). In Wyoming, the species occurs in the northeastern portion of the state as well as in the Black Hills and Bearlodge Mountains.

**General abundance and distribution of Black-backed woodpecker observations along point transects on the Black Hills National Forest in 2003 and 2004.**

2003 2004




Source: Panjabi (2004, 2005)

In the Black Hills, black-backed woodpecker distribution and abundance is closely associated with recent stand replacing fires (Panjabi 2001, 2003, 2004, 2005) and insect out-breaks (Bonnot 2004, Rumble 2002). They also occur at much lower densities throughout the remainder of the Forest (Mohren 2002; Panjabi 2001, 2003, 2004, 2005).

In his baseline population study, Mohren (2002) estimated that approximately 1,200 backed woodpeckers occurred in the Black Hills during 2000, with an average Forest-wide density of 1 bird/883 acres (0.28 birds/km$^2$). The estimate applied across all habitat types on the Forest, excluding large recent burns, which did not exist. According to Mohren (2002), the Forest-wide

density estimate was similar to what has been recorded in other unburned habitats across the species range. Since Mohren's first estimate was derived, several large fires occurred in the Black Hills, which has undoubtedly increased the black-backed woodpecker population. The Black Hills National Forest is monitoring the black-backed woodpecker population within both burned and unburned habitats; data are provided in habitat descriptions below (USDA-Forest Service 2004b).

In the Black Hills, black-backed woodpeckers are associated with ponderosa-pine habitats that have high populations of their main prey: the larvae of wood-boring beetles, engraver beetles, and bark beetles (Anderson 2003). Recently burned pine forests and areas infested with mountain pine beetles are most preferred by black-backs. The species can also be found in forests that are relatively unaffected by beetles, but it is relatively rare in such places.

Habitat conditions have been favorable for the black-backed woodpecker over the past few years due to numerous large fires and beetle outbreaks. Almost 175,000 acres have burned in the Black Hills over the past five years, with much of this occurring in ponderosa pine. In 2003 mountain pine beetles or pine engraver beetles killed almost 400,000 pine trees. Most of the insect-caused mortality occurred in individual or small groups of trees, but a few large areas of concentrated mortality also occurred. Substantial portions of these burned and infested areas currently provide suitable habitat for black-backed woodpeckers. See the Natural Disturbance Processes section of the Draft EIS for supporting information about fire and insects.

Black-backed woodpecker populations are often irruptive as they follow outbreaks of wood-boring beetles after fires (Dixon and Saab 2000; USDA-Forest Service 2000a). Large movements have been noted across North America in response to changing habitat and insect conditions. Abundance peaks within the first few years after a fire but decreases as snags decay and beetles decrease. It appears that black-backed woodpecker densities peaked in the 2000 Jasper Burn during the second-post fire year, when one bird/36 acres (or 6.9 birds/$km^2$) were observed (Panjabi 2003). This is nearly 25 times higher than what Mohren (2002) found as a Forest-wide average. One year later, densities in the Jasper Burn had declined by nearly half (Panjabi 2004), but they were still much higher than what has been found in other habitats.

In many areas, nest productivity of woodpeckers is higher in burned areas than unburned areas. This has led researchers to hypothesize that burned areas provide surplus birds to augment or re-populate areas where mortality exceeds reproduction (Vierling 2004, Hutto 1995). Thus, periodic fires may be important to sustaining black-backed woodpecker populations over long periods of time. Though burned forests are suspected to function as a source habitat, there is a lack of information on movements and mortality to support this.

Vierling (2004) studied habitat use by black-blacked woodpeckers in the Jasper Burn. Her results show black-backs selected areas with high snag densities and avoided areas with low snag densities (e.g., salvage-logged areas). These results are consistent with other research across the woodpecker's range (Anderson 2003). Vierling also found more nests in areas that had high pre-fire canopy cover (>70 percent) than in areas with moderate pre-fire canopy cover (40 percent to 70 percent). This suggests that pre-fire vegetative conditions may influence post-fire use of an area by black-backed woodpeckers. Saab et al. (2002) noted the same trend in Douglas fir forests of Idaho.

Unburned pine stands infested with mountain pine beetles (bark beetles) are also important to black-backed woodpeckers. Rumble (2002) found that the density of black-backed woodpeckers in the heavily infested Beaver Park area was approximately seven times greater than what Mohren (2002) found across all habitats in the Black Hills. The core of the infestation had densities that were 32 times higher than the Forest-wide average; this is the highest density recorded on the Forest, although it occurred over a fairly small, localized area.

In unburned, uninfested pine habitat of the Black Hills, black-backs select mature or late-successional pine stands with high canopy cover, high tree densities, and high snag densities (Mohren 2002, Panjabi 2001, Panjabi 2003, USDA-Forest Service 2000b). These conditions are found primarily in structural stages 4C and 5. There are currently 136,000 acres of pine in these two structural stages. Panjabi (2003) found one bird/190 acres (1.3 birds/$km^{2)}$ in these types of stands, which is over five times higher than what Mohren (2002) reported as a Forest-wide average. Black-backs also use sapling-pole stands with any amount of canopy cover (i.e., structural stages 3A, 3B, and 3C) but to a lesser degree than any of the other habitat structures mentioned thus far (Mohren 2002, USDA-Forest Service 2000b). Mohren (2002) reported that black-backed woodpeckers avoid mature pine stands that do not have high canopy cover (i.e., structural stages 4A and 4B).

Black-backed woodpeckers nest in hard snags or live trees with diameters of nine to 18 inches (Anderson 2003). They excavate nest cavities into the tree's sapwood and thus often prefer smaller diameter trees than other woodpecker species (Dixon and Saab 2000, Mohren 2002). Live nest trees generally have heart rot, which makes excavation easier (Anderson 2003, Mohren 2002). Ponderosa pine appears to be the most important nest tree in the Black Hills, as all recent studies report nests in only that species (Vierling 2004, Mohren 2002, Rumble 2002). The distribution, arrangement, and size of patches of snags needed are uncertain, but the literature suggests that snags should be clumped (Dixon and Saab 2000). Mohren (2002) reported that the average snag density in unburned foraging habitat in the Black hills was 47 snags per acre. He found that black-backs selected for shorter snags (16.5 ft. average) than available and small diameter snags (7 inch average).

Like its close relative the three-toed woodpecker, fire suppression, harvest of late-successional forest and post-fire salvage logging can be detrimental to the black-backed woodpecker (Dixon and Saab 2000).

### 4-6.2.1 Direct and Indirect Effects

Pine forests that are recently burned or infested with beetles provide the best habitats for the black-backed woodpecker. High snag densities preferred by black-backs (Mohren 2002) will most likely occur in stand replacing fires and insect outbreaks. Thus, alternatives that alter the occurrence of or potential for fire or high beetle populations would have effects to the species.

The effects to fire-hazard ratings are discussed in Section 3-7.1 Fire. Alternative 6 provides the greatest reduction of high or very high fire hazard followed by Alternative 3, Alternative 1, and Alternative 2. Alternative 4 provides the least reduction in fire hazard rating. Fire hazard reduction does not necessarily reduce the probability that a fire will occur. However, lower

hazard increases the probability of lower fire intensity (surface fire versus crown fire) and easier control or containment should a fire occur.

Moderating the Forest for fire-and-insect hazard ratings is directly correlated with a reduction in high-density stands that provide unburned, uninfested habitat. In other words, treating high density live stands to reduce fire-and-insect hazard ratings not only reduces the chance that these stands would burn or become bug infested, but it would also reduce their suitability as an unburned, uninfested habitat. Hence, these types of treatments would reduce all three major habitat types for black-backed woodpeckers.

Fire activity and acres burned have been above average in recent years. The amount of severely burned acres is higher at present than normal and will not be sustained over time, regardless of the alternatives. The amount of severely burned acres will likely be less in the future (see Section 3-7.1 Fire). Burned habitat has the potential to be the lowest in Alternative 6, followed by Alternative 3, Alternative 1 and Alternative 2, due to efforts to reduce fire hazard that could lead to fewer stand-replacing fires. Burned habitat has the potential to be the highest in Alternative 4.

In the event that wildfires would occur, Objective 11-03 would guide value recovery (i.e., salvage logging) under Alternatives 3, 4, and 6. No value recovery would occur under Alternative 4; this would provide maximum potential habitat benefit to the black-backed woodpecker, as no habitat would be altered. In Alternatives 3 and 6, dead trees would be available for value recovery, excepting 50 percent of the recent (zero-to-five years) stand-replacing fire acreage Forest-wide, up to 10,000 acres unsalvaged in any given five-year period. As burns age beyond five years, new burns would be added to the unsalvaged quota. In Alternatives 3 and 6, highest priority to remain unsalvaged would be areas that had greater than 70 percent pre-fire canopy closure. . In alternative 6, stand replacing insect infestations also contribute to the 10,000 acre area.

The amount and age of the unsalvaged areas were based on the black-backed woodpecker recommendations provided in the Wyoming Bird Conservation Plan (Nicholoff 2003). The Conservation plan recommendations were intended to provide a continual supply of burned black-backed woodpecker habitat over at least one percent of the ponderosa-pine landscape at any given time. The five-year period is based on recommendations in Dixon and Saab (2000), which suggests avoiding post-fire salvage logging in portions of large burned areas for five years after fire. The assumption is that providing recently-burned habitat over space and time would ensure long-term persistence of the species across the landscape.

Areas with greater than 70 percent pre-fire canopy cover were prioritized in Alternatives 3 and 6 to ensure that the highest quality burned areas remain unsalvaged. Areas with greater than 70 percent pre-fire canopy cover have revealed more nests than areas with less cover (Vierling 2004, Saab et al. 2002

Alternatives 1 and 2 do not provide specific direction for post-fire value recovery. In these two alternatives, post-fire value recovery is guided by the Forest-wide snag objective (Objective 211) and standards and guidelines (Standards and Guidelines 2301-2305).

High snag densities preferred by black-backs (Mohren 2002) will most likely occur in stand replacing fires and insect outbreaks. Objective 11-03 in Alternatives 3, 4 and 6 provides management guidance for retaining a portion of these conditions as they occur. Alternative 4 provides the highest likelihood these conditions will be maintained. In Alternatives 3 and 6, Objective 11-03 is consistent with Nicholoff (2003) and will likely provide sufficient areas of dense snags while allowing some post-fire value recovery. Alternatives 1 and 2 do not include Objective 11-03. However, Mohren (2002) found areas of higher snag density on the Forest even though there was not direction in the Forest Plan similar to Alternatives 1 and 2. There will likely be some areas on the Forest with higher snag densities under Alternatives 1 and 2, but the absence of Objective 11-03 leads to a higher level of uncertainty these conditions will exist.

Standard 2301a (retaining large snags and minimum snag densities) would not apply to salvaged areas under Objective 11-03 (Alternatives 3 and 6). This would have little or no effect on the black-backed woodpecker because the species typically does not use salvaged areas or burned areas with low snag densities, regardless of snag size (Dixon and Saab 2000, Vierling 2004).

Objective 211, Standard 2301a-e, and Standard 2302 would be applied to snag management in post-fire conditions under Alternatives 1 and 2. They would also be used to guide snag management in all alternatives after large beetle infestations occur, and in general forest conditions (i.e., within live forests). The specific language varies by alternative and must be tracked in the appropriate context.

Snags within unburned, uninfested (with insects) forest provide habitat for black-backs between fires and insect outbreaks, spatially and temporally. Alternative 1 manages for an average of 1.08 snags per acre across the conifer forested portion of the Forest (Objective 211, Standard 2301). Alternatives 2 and 4 manage for 2 – 4 snags per acre in ponderosa pine forested types, averaged across the watershed, at least 25% of which are greater than 20 inches in diameter. Alternatives 3 and 6 manage for 3 snags per acre across the conifer forested portion of the Forest, at least 25 percent of which are greater than 14 inches in diameter. Alternatives 3 and 6 also retain all snags greater than 20 inches in diameter unless they are a safety hazard (Standard 2301). In all alternatives, snag densities should be met across relatively large areas (e.g., watersheds or project areas), not necessarily every acre. This, combined with Objective 11-03 in Alternatives 3, 4 and 6, is expected to produce some areas with high snag densities and other areas with lower densities.

Snags in unburned, uninfested forests provide habitat for black-backs between fires, spacially and temporally. Mohren (2002) reported that the average snag density in unburned foraging habitat was 47 snags-per-acre. Morhen's snag data included all size classes, and there was some selection for smaller diameter snags (mean = 7 inches). Forest Inventory Analysis data estimates a Forest average of 79 snags per acre in all size classes. RMRIS data (2004) estimates a Forest average of 85 snags per acre in all size classes. These are Forest averages and some areas likely have higher densities while other areas have fewer snags. This data was collected prior to the recent fires and insect outbreaks since 2000, which have contributed additional snags to the landscape. None of the alternatives propose a change to the management of smaller diameter snags (0 – 9 inches diameter). As a result, overall snag densities will likely continue to exceed the amounts found by Mohren (2002).

Objective 211 provides direction for larger snags, which also contribute to black-backed woodpecker habitat. Alternative 1, which specifies only 1.08 snags-per-acre, would have the highest risk of not providing larger snags for black-backed woodpeckers across unburned, uninfested landscapes. In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

Alternatives 2 and 4 would likely provide the least risk, since an average of four snags is specifically called for in areas with infrequent fire intervals. Alternatives 3 and 6, which call for three snags-per-acre, would have slightly more risk than Alternatives 2 and 4. However, the risk associated with any of the alternatives except Alternative 1 would be relatively small because some areas would have snag densities that exceed the prescribed average.

Although each of the alternatives varies in its snag-size requirements, this would likely have negligible effects on black-backed woodpeckers. This is because the species uses relatively small snags for foraging (five-to-12 inches dbh; Mohren 2002) and nesting (nine-to-18 inches dbh; Anderson 2003). All alternatives but Alternative 1 specify that all snags counting toward density objectives would be at least nine inches dbh and further promote that some would be at least 14 (Alternatives 3 and 6) or 20 inches (Alternatives 2 and 4).

Wood boring insects are an important food source for black-backs. All alternatives manage for reducing fire hazard and insect risk. All alternatives have the same level of commercial timber harvest estimated acres. There is an estimated range of precommercial or small diameter tree thinning among the alternatives. Alternative 1 & 2 have the same level as the 1997 forest plan chosen alternative. Alternative 6 has the highest estimated thinning acres. As described above, more thinning acres reduce the probability of insect mortality and the availability of insects for black-backed woodpeckers. Alternative 6 has the greatest potential to reduce insect caused tree mortality.

Mature and late-successional pine stands (structural stages 4C and 5) are important to all three habitat types used by black-backed woodpeckers: burned forest (through risk of fire and pre-fire canopy cover), beetle-infested stands (through risk of infestation), and unburned, uninfested forest (through high canopy cover, high tree density, and high snag density) ) (Mohren 2002; Panjabi 2001; Panjabi 2003; and USDA-Forest Service 2000b). There are several objectives (Objectives 207, 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204) that would affect the availability of these structural stages in each of the alternatives. The table below shows the expected availability of these structural stages if the objectives in each alternative are met (See Section 3-2.1.1, Forested Ecosystems).. The table shows that Alternative 4 could have the most acreage in these structural stages, followed by Alternatives 3 and 6, respectively. Alternatives 1 and 2 do not have an objective for structural stage 4C, so the acreage is only Structural Stage 5.

**Table C-2.** Expected ponderosa pine Structural Stages 4C and 5 Acreage if Objectives 207, 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 are achieved

| | Current Conditions | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 6 |
|---|---|---|---|---|---|---|
| Acres | 136,000 | 51,779[1] | 51,779[1] | 163,247 | 185,035 | 118,887 |

Source: Forest Resource Information System (see Section 3-2.1.1).

[1]Alternatives 1 and 2 do not have an objective for structural stage 4C. Acreage represents structural stage 5 only

As discussed previously, the most important factors for woodpeckers are the avilability of recently burned areas (un-salvaged), snags, and mature and dense late-successional pine forest. Alternative 4 will likely provide the most potential habitat for black-backs by providing the most unsalvaged burned habitat (Objective 11-03), the most late-successional and dense mature forest (Objective 207), and sufficient snags forest-wide (Standard 2301). Alternative 3 is slightly less beneficial to black-backs than Alternative 4, but still provides potential habitat by providing up to 10,000 acres of unsalvaged burned habitat, and increase in late-successional and dense mature forests over existing conditions, and sufficient snags Forest-wide. Alternative 6 is similar to Alternative 3 except that is manages for less late-successional and dense mature forests than currently exists. Alternative 2 contains sufficient Forest-wide snag direction, but does not include any direction for providing unsalvaged burned habitat or dense mature forests, which leads to less certainty in providing habitat for the species. Alternative 1 provides for the lowest snag densities (Standard 2301) and does not include direction for unsalvages burned habitat or dense mature forests, leading to the least certainty in providing black-backed woodpecker habitat.

Habitat fragmentation will not be limiting to black-backs. Black-backed woodpecker populations are often irruptive as they follow outbreaks of wood-boring beetles after fires (Dixon and Saab 2000; USDA-Forest Service 2000a). Black-backs have adapted to take advantage of the sporadic occurrence of fire. They are highly mobile and able to colonize habitat, especially burned areas.

Black-backed woodpecker populations on the Forest are doing well due to the recent fire and insect activity over the last five years. Under all alternatives, populations can be expected to decline as these recent fires age. It is unreasonable to expect the level of recent fire and insect activity to continue over the long term. Some fires and insect activity will likely occur over time (see the Fire and Insect Sections, 3-7) separated by periods of low fire and insect activity. Black-backed woodpecker populations will likely follow a similar pattern. Populations will likely be similar to current levels during periods of high fire and insect activity. During periods of low fire and insect activity, populations will likely be similar to those found by Mohren (2002).

RNAs could be established with the implementation of Alternatives 3, 4, or 6. There are ponderosa pine community types in all candidate RNAs with the exception Lemming Draw. RNA establishment would preclude harvest within the RNA boundary. Ponderosa pine communities within the RNA would be allowed to go through natural succession, and in the absence of natural disturbance events such as fire or insect infestations, would eventually approach late-successional conditions, thus contributing to the conservation of black-backed woodpeckers.

In the absence of fire, timber stands within the RNA would tend toward a higher fire-hazard rating. There may be more stand-replacing fires in the short-term that provide black-backed woodpecker habitat. In the event of natural periodic fire, it is reasonable to assume that vegetation communities within the RNAs would eventually return to conditions more like those that existed before the Forest was managed. Vegetation conditions historically supported fewer catastrophic, stand-replacing fires and more frequent low intensity burns than currently occur on the Forest.

Refer to the RNA section and Appendix G for candidate RNA locations and additional information on the size and composition of each.

### 4-6.2.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Mount Rushmore National Memorial, Jewel Cave National Monument, Wind Cave National Park, and Custer State Park likely provide additional suitable habitat in the Black Hills. These areas are managed somewhat differently than the Black Hills National Forest, particularly regarding timber and recreation. Each of these parks contains a substantial amount of late-successional forests, and provides the vegetative characteristics used by the black-backed woodpecker (e.g., snags). Recreational use may be higher in some portions of the parks than in most of the Forest, but the use is generally confined to roads and trails, leaving many suitable areas undisturbed for unaltered reproductive behavior.

Privately owned lands within and adjacent to the Forest boundary may also provide suitable habitat for the black-backed woodpecker. Fire hazard reduction activities are likely to increase on some of these lands in effort to prevent loss of homes from wildfire. This could result in an additional loss of habitat (burned or unburned). However, the amount of area within these private lands is relatively small compared to what is on the Forest.

Alternative 4 is likely to have the least cumulative effects because it has a higher snag density requirement, maintains the most structural stage 4C and 5, and allows no value recovery of dead trees following a wildfire. Alternatives 3 and 6 is likely to have more cumulative effects than Alternative 4 because they allow some salvage of dead trees following a wildfire (Objective 11-03) and may result in less structural stage 4C and 5. Alternative 2 is expected to have more cumulative effects than Alternatives 3 and 6 because it does not include direction for maintain dead trees following a wildfire and may result in less structural stage 4C and 5. Alternative 1 could result in the most additive effects from management activities on the Forest due to the lower snag density standard, the allowance for habitat capability to decline continuously (Guideline 3201), and the lack of direction on post-fire salvage (11-03).

### 4-6.2.3 Determination and Rationale

**May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area.** Black-backed woodpeckers would be affected by fire-and-insect hazard reduction activities, salvage operations, other snag management, and the availability of mature and late-successional forest. Alternative 4 would consistently have the lightest effects to black-backed woodpeckers regarding these items. The remaining alternatives contain a mix in relative effects. However, all alternatives would likely allow the black-backed woodpecker to persist on the Forest over the next 50 years, partly because mature and late-successional forests would largely remain intact as habitat to support low densities of woodpeckers between episodes of disturbance. Although the amount of fire-and-insect disturbance would probably be reduced under all alternatives over at least the next decade, not all Forest acres would be treated to reduce fire and insect risk. Some areas would remain in structural stages susceptible to fire and insects. This would likely result in at least some fire and beetle outbreaks occurring across the landscape over time.

Under all alternatives, there will be adequate habitat for maintaining viable populations for black-backed woodpeckers. Based on expected habitat changes, all alternatives would provide unburned habitat for the black-backed woodpecker within structural stages 4C and 5 (dense mature and late-successional pine and spruce). Mature and late-successional habitat will be distributed as patches at low abundance, and there may be gaps where this habitat is absent or only present in low abundance. However, the areas of mature and late-successional habitat will typically be large enough and close enough to permit dispersal and interaction among subpopulations. Recently burned habitat will likely decline from recent highs and will likely be distributed as patches in low abundance. Woodpeckers are highly mobile and dispersal is not a concern between burned areas. Burned habitat will likely be lowest in Alternative 6, due to efforts to reduce fire hazard that could lead to fewer stand-replacing fires. All alternatives provide for snags distributed across the landscape. Alternative 1, which specifies only 1.08 snags-per-acre, would have the highest risk of not providing adequate snags for black-backed woodpeckers across unburned landscapes. The determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards structural stage and late successional objectives for each alternative. The time required to reach these objectives is dependent on funding and forest growth rates, which are not included in this analysis. As a result, it may take two or more decades to achieve these objectives.

## 4-6.3. Burrowing Owl

The western burrowing owl is a grassland specialist distributed throughout western North America, primarily in open areas with short vegetation and bare ground (Klute et al. 2003). The northern populations of owls are migratory and may winter in the southwestern US and Mexico (Johnson and Anderson 2002). Populations have declined in several large regions, most notably in the northeastern Great Plains and Canada. Such declines are mainly due to habitat loss and

fragmentation through conversion for agricultural and urban development, and the reduction of prairie dogs (Klute et al. 2003). Numerous authors have identified elimination of burrowing rodents through control programs as the primary factor in the recent and historical decline of burrowing owl populations (Klute et al. 2003).

The U.S. Fish and Wildlife Service designated the burrowing owl as a Category 2 species in 1994, but that designation was discontinued in 1996. The U.S. Fish and Wildlife Service currently list it as a Bird of Conservation Concern nationally and in the Mountain-Prairie Region (US Fish and Wildlife Service 2002). Burrowing owls are listed as endangered in Canada and as threatened in Mexico. Wyoming lists the burrowing owl as a species of concern, but the species has no legal status in South Dakota (Klute et al. 2003).

Burrowing owl nesting habitat typically consists of level, open landscapes with sparse grassland vegetation that either has low structure or is heavily grazed (Johnsgard 1988), either by cattle or prairie dogs (Klute et al. 2003). They are dependent on burrowing mammals whose vacant burrows are used for nesting and roosting; the burrows of prairie dogs, particularly black-tailed prairie dogs, are of central importance (Johnson and Anderson 2002, Klute et al. 2003).

In addition to nest sites, burrows also provide perches, sites for food storage, escape from enemies, and reduced temperature extremes (Johnsgard 1988). Burrow availability is often limiting in areas lacking colonial burrowing rodents (Klute et al. 2003), although burrowing owls do not occupy all apparently available habitat (i.e. prairie dog or ground squirrel colonies) (Klute et al. 2003). Prairie dogs manipulate vegetation to provide optimal cover for nest sites while not obscuring the owls' vision (Johnsgard 1988; Johnson and Anderson 2002). While burrowing owls nest and roost in short grass habitats, they forage over a variety of habitats including tall grass, cropland, and fallow fields (Klute et al. 2003). A mosaic of grassland habitats is therefore important to provide suitable nesting and foraging habitat diversity.

The burrowing owl is an uncommon-to-locally-common migrant and summer resident in western South Dakota, except in the Black Hills where it is rare (Tallman et al. 2002). According to the South Dakota Breeding Bird Atlas (Peterson 1995), concentrations of burrowing owls were noted in or near Buffalo Gap National Grassland and Badlands National Park, as well as several counties in the southwestern and north-central portions of the State. In Wyoming, it is an uncommon summer resident in suitable habitat throughout most of the state; there are reports of burrowing owls in the Black Hills region of Wyoming (Luce et al. 1999). Habitat for burrowing owls on the Forest is limited; the availability of black-tailed prairie dog colonies may be the greatest limiting factor (Johnson and Anderson 2002). The Forest currently has approximately 265 acres of occupied prairie dog colonies in the southern portion of the Forest (USDA-Forest Service 2003j). Monitoring data indicates the prairie dog towns have remained stable or increased in size (USDA-Forest Service 2004b). A burrowing owl was observed in 2002 (Panjabi 2003), and another observation occurred on the Forest in June 2004 by the Rocky Mountain Bird Observatory during ongoing breeding bird monitoring (USDA-Forest Service 2004i). The 2004 observation was associated with a prairie dog town on the Hell Canyon Ranger District.

### 4-6.3.1 Direct and Indirect Effects

Due to the strong association of nesting burrowing owls with prairie dog towns, management actions and direction affecting black-tailed prairie dogs are likely to affect the suitability of burrowing owl habitat on the Forest. The grassland ecosystem in general would be managed according to Objective 205 and Guideline 2107, which provide guidance for restoring grassland habitats by treating encroaching pine. The extent of restoration varies among the alternatives, with Alternatives 1, 2, and 4 maintaining existing grassland communities, and Alternatives 3 and 6 somewhat increasing the current extent of grasslands on the Forest. The extent to which Objective 205 would benefit black-tailed prairie dog habitat and thus burrowing owl habitat is limited by the amount of potentially suitable prairie dog habitat (with non-rocky soils conducive to burrowing). The potential for prairie dog expansion on the Forest is limited because prairie dog towns on the Forest quickly reach private land or encounter rocky soils that make burrowing difficult. Large areas of potentially suitable prairie dog habitat are not present on the Forest.The majority of restoration efforts would likely occur on soil types that are not suitable for prairie dogs. Implementation of these restoration efforts, regardless of alternative, would not significantly increase the amount of suitable burrowing owl habitat on the Forest.

Since prairie dogs, nesting burrowing owls, and other associated species prefer short grass conditions, Objective 200-09 promotes low grassland structure in the vicinity of prairie dog towns in Alternative 3. With Objective 200-02, Alternative 3 also provide for a diverse gradient of structure in prairie grasslands preferred by foraging owls by maintaining 20 percent of such areas with high grass/forb cover.

Alternative 6 manages for 200 to 300 acres of prairie dog towns on the Forest, in at least 3 separate towns (Objective 200-09). Currently there are about 265 acres of prairie dogs on the Forest. About 250 of these acres are within 3 towns. Managing for 200-300 acres allows for natural fluctuations due to drought or wet cycles. Also, prairie dogs can be a problem to adjacent landowners. The objective allows for management, including control, to meet the needs of adjacent landowners, while maintaining the major towns on the Forest.

Objectives 200-02 and 200-09 provide no such guidance in Alternatives 1, 2, or 4.

Impacts to prairie dogs may affect burrowing owl habitat; recreational shooting of prairie dogs, habitat destruction from oil-and-gas development and from surface disturbing construction activities, and avian and mammalian predation on prairie dogs may also affect burrowing owls. Alternatives 2 and 4 emphasize maintenance of prairie dog towns (Standard 3118) while Alternatives 3 and 6 prohibit major soil disturbing activities in existing prairie dog towns. Maintaining prairie dog towns could be a problem in Alternatives 2 and 4 during wet periods. Alternatives 3, 4, and 6 provide more extensive protection measures for prairie dog towns by requiring new structures in such areas to be designed to discourage avian predators (Standard 3100-03). Alternatives 1 and 2 provide no such provisions for structures within prairie dog towns.

The resource conservation measures identified above are likely to affect grassland communities and the species that inhabit them. As such, the measures have the potential to maintain and improve habitats suitable for burrowing owls. Prairie dog towns have remained stable or

increased on the Forest (USDA-Forest Service 2001c), and are expected be maintained or enhanced by the above measures. In the absence of sylvatic plague, prairie dogs and thus potentially suitable burrowing owl habitat are expected to persist on the Forest over the next 50 years although their occurrence will continue to be limited in distribution and abundance. Continued monitoring of prairie dog towns and breeding birds, including burrowing owls, will provide valuable information toward maintaining these species and their habitats on the Forest.

### 4-6.3.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Adjacent to the Forest, Wind Cave National Park and Custer State Park contain and manage for prairie dog towns that provide limited, but suitable habitats for the burrowing owl. Estimates of suitable prairie dog or burrowing owl habitat on private lands are not available, although prairie dog control efforts on private lands may negatively impact burrowing owls. Burrowing owls are known to scavenge dead rodents on occasion and are highly susceptible to secondary poisoning by rodenticides (Klute et al. 2003). Suitable habitats for prairie dogs and burrowing owls will likely persist for the next 50 years; however, their occurrence will continue to be limited in distribution and abundance.

Alternatives 3 and 6 will likey have the least cumulative impacts to burrowing owls due to Objectives 200-02 and 200-09 and Standard 3103 that apply to prairie dogs. Alternatives 1, 2, and 4 do not include this direction.

### 4-6.3.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Because burrowing owls are associated with black-tailed prairie dogs and prairie grassland habitats, Forest-wide objectives, standards, and guidelines designed to conserve and enhance grassland habitat and maintain and protect existing prairie dog towns will ensure persistence of black-tailed prairie dogs and burrowing owl habitat in the Black Hills. Alternatives 1 and 2 represent the highest risk due to the lack of or minimal direction or protective standards specific to prairie dogs or their habitats. Alternatives 3, 4, and 6 represent the least risk due to several protective standards specifically focused on black-tailed prairie dogs and their habitats. Continued monitoring of prairie dog towns and breeding birds, including burrowing owls, will provide valuable information toward maintaining these species and their habitats on the Forest. The determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Sylvatic plague will not become a problem in the prairie dog towns.

## 4-6.4. Ferruginous Hawk

The ferruginous hawk ranges through most of the western United States. Its breeding range extends from northern Arizona, New Mexico, and Texas north to southern Canada. The bird winters primarily from the southwestern and south central United States south to central Mexico (Bechard and Schmutz 1995). In South Dakota, it is considered an uncommon to fairly common summer resident in prairies, chiefly in the western but also northeastern part of the state (South Dakota Ornithologist's Union 1991). In Wyoming, ferruginous hawks are a common resident, with breeding records across most of the state, but there is a noticeable drop in numbers in the winter (Luce et al. 1999). Ferruginous hawks prefer open rolling or rugged terrain and avoid high elevations, forest interiors, narrow canyons, and cliffs (Bechard and Schmutz 1995), which may account for their rarity in the Black Hills.

Vulnerability of prey also is an important factor in habitat suitability, such that ferruginous hawks avoid dense vegetation that reduces their ability to see prey (Dechant et al. 2003). Their diet is almost exclusively small mammals, including ground squirrels and jackrabbits, but the species will also take snakes, lizards, birds, and large insects (Dechant et al. 2003).

Conversion of grasslands to intensive cultivation has reduced the amount of preferred habitat available to ferruginous hawks and has been implicated in the population decline of the species in some areas (Dechant et al. 2003). Grazing benefits ferruginous hawks by reducing vegetative cover and making prey more visible (Dechant et al. 2003).

The ferruginous hawk is not known to breed or winter on the Forest but may migrate through it (Peterson 1995; South Dakota Ornithologist's Union 1991).

The most recent estimate of area covered by grasslands on the Black Hills is approximately 110,000 acres. Grasslands on the Black Hills can be distinguished into two primary groups: prairie grasslands and interior grasslands. Prairie grasslands refer to those grasslands that generally occur on the outer perimeter of the Black Hills as a transition between the true prairie ecosystems and the forested ecosystems of the foothills and mountains. Interior grasslands occur within the forested perimeter of the Black Hills and can include large areas dominated by plant species typically associated with prairie systems (e.g., Reynolds and Gillette Prairies).

### 4-6.4.1 Direct and Indirect Effects

Ferruginous hawks are not known to nest on the Forest; therefore, management activities are unlikely to directly affect this species. Generally, ferruginous hawks may be affected by habitat loss due to conversion of grassland to agriculture and the availability of prey populations, including prairie dogs. Changes in the amount or distribution of grassland habitat may affect migrating ferruginous hawks.

Under Alternatives 3 and 6, Objective 205 targets approximately 12,000 acres of prairie grasslands (a 13 percent increase) for restoration, primarily where pines are encroaching on existing grasslands. Under Alternatives 1, 2, and 4, an increase in grassland (meadow and prairie) acreage by 10 percent is targeted (Objective 205), but this increase may only compensate for future pine encroachment and allow for maintenance of the 1995 level of grassland on the Forest.

In some areas of its range, the ferruginous hawk relies heavily on prairie dogs as a source of food during migration. For this reason, Objective 200-09 and Standards 3100-03 and 3118 could benefit ferruginous hawks. Objective 200-09 promotes low grassland structure in the vicinity of prairie dog towns in Alternative 3. Alternative 6 manages for 200 to 300 acres of prairie dog towns on the Forest, in at least 3 separate towns (Objective 200-09). Currently there are about 265 acres of prairie dogs on the Forest. About 250 of these acres are within 3 towns. Managing for 200-300 acres allows for natural fluctuations due to drought or wet cycles. Also, prairie dogs can be a problem to adjacent landowners. The objective allows for management, including control, to meet the needs of adjacent landowners, while maintaining the major towns on the Forest.

Objective 200-09 provides no such guidance in Alternatives 1, 2, or 4.

Alternatives 2 and 4 emphasize maintenance of prairie dog towns (Standard 3118) while Alternatives 3 and 6 prohibit major soil disturbing activities in existing prairie dog towns. Maintaining prairie dog towns could be a problem in Alternatives 2 and 4 during wet periods. Alternatives 3, 4, and 6 provide more extensive protection measures for prairie dog towns by requiring new structures in such areas to be designed to discourage avian predators (Standard 3100-03). Alternatives 1 and 2 provide no such provisions for structures within prairie dog towns.

The resource conservation measures identified above are likely to affect grassland communities and the species that inhabit them. Prairie dog towns have remained stable or increased on the Forest (USDA-Forest Service 2001c), and are expected be maintained or enhanced by the above measures. In the absence of sylvatic plague, prairie dogs are expected to persist on the Forest over the next 50 years although their occurrence will continue to be limited in distribution and abundance. Continued monitoring of prairie dog towns and breeding birds will provide valuable information toward maintaining these species and their habitats on the Forest.

This analysis highlights some of the more significant objectives, standards, and guidelines in conserving important grassland habitat characteristics. See Section3-2.2 Grassland/Shrubland Ecosystem in Chapter 3 of the FEIS for a more comprehensive account of grassland management.

### 4-6.4.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Efforts to maintain the existing prairie dog towns and to increase grassland acreage on the Forest are likely to have a negligible impact on suitable foraging habitat for this species in comparison to what is available on non-Forest System Lands. Mixed grass prairie is fairly common, especially in the southern Black Hills. However, much of it is under private ownership (Panjabi 2003). Any cumulative impact on ferruginous hawks on private lands depends largely on the

attitude of local landowners toward prairie dogs. Landowners generally do not view prairie dogs favorably and may eradicate them on their land. This would reduce the population of a potentially important prey species for the hawk.

There would be no cumulative effect to ferruginous hawks given the absence of direct or indirect effects.

### 4-6.4.3 Determination and Rationale

**No impact.** Ferruginous hawks have not been documented on the Forest, but might occur here during migration. Potential habitat is naturally limited in the Black Hills. Treating pine encroachment in grasslands and maintaining prairie dog colonies on the Forest is not expected to result in sufficient changes in conditions to increase numbers of this species on the Forest. The determination is based on the assumption that conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

## 4-6.5. Flammulated Owl

The Flammulated owl breeds in mountain ranges from Central America north through the western US to southern British Columbia; it winters from Mexico into Central America (Johnsgard 1988; Sibley 2000). In the United States and Canada, it lives in montane forest habitats dominated by yellow pines (i.e., ponderosa and Jeffrey). Distribution of the owl is scattered as a consequence of habitat distribution and the bird's less-than-full occupation of yellow pine habitats (Hayward and Verner 1994). The species is conspicuously absent from various yellow pine forests in the western United States, including ponderosa-pine forests in Wyoming (e.g., Bighorn Mountains) and eastern Montana.

Until recently, the flammulated owl was thought to be absent from the Black Hills. In their range-wide assessment of the owl, Hayward and Verner (1994) specifically noted that the species was not present in the Black Hills despite the availability of seemingly suitable ponderosa-pine habitat. Other accounts support the absence by failing to mention species presence (e.g., South Dakota Ornithologist's Union 1991; Peterson 1995; Luce et al. 1999). However, there have been two reports of flammulated owls in the past 10 years that could be valid sightings. These could represent periodic use by transient individuals, or the beginning of a range expansion. Establishment of flammulated owls in newly occupied habitat could take many years, because the species has a low reproductive potential (Hayward and Verner 1994). A concerted effort was made to verify flammulated owls at the two recent observation areas and other seemingly suitable sites during 2003, but the species was not detected (Fauna West Wildlife Consultants 2003).

Flammulated owls are associated primarily with ponderosa pine and Jeffrey pine habitats. In the Black Hills, only ponderosa pine is present. Flammulated owls select older seral stages for breeding and nesting (Hayward and Verner 1994). They are often associated with old-growth forests. The flammulated owl is a secondary cavity nester, and depends upon flickers and other woodpeckers for cavity excavation (Ehrlich et al. 1988, Hayward and Verner 1994). In their summary of nest site characteristics across three studies in New Mexico and Oregon, Hayward

and Verner (1994) did not indicate important characteristics of cavities except to say they occurred in snags that averaged between 19 and 28 inches dbh. Large snags such as these are rare in the Black Hills and occur at a rate of approximately 0.3 per acre (see Ponderosa-pine Ecosystems section in DEIS).

Interior and exterior forest edge seems to be a desirable if not necessary component of flammulated owl habitat (Hayward and Verner 1994). Clumped tree distributions, multi-layered canopy, and a well-developed shrub component contribute to internal forest edge. Low-to-moderate canopy closure prevails in most sites used by the owl (Hayward and Verner 1994). Relatively open, multi-layered habitats with considerable edge may not only maximize prey density but also accommodate the foraging strategies used by this owl (Hayward and Verner 1994). The species is almost entirely insectivorous, capturing insects on the ground, on vegetation, and in flight (USDA-Forest Service 1981; Ehrlich et al. 1988).

The ponderosa-pine structural stages corresponding most closely to potential flammulated owl nesting and foraging habitat on the Forest are 4A, 4B, and 5. Currently, 57 percent (594,000 acres) of the Forest is in these structural stages.

Flammulated owls appear to prefer denser vegetation for roosting (Hayward and Verner 1994). Across the species range, they have been found roosting in mixed conifer stands, thickets, and other conditions with high foliage density or multi-layered canopy that were in close proximity to nest sites (e.g., <300 feet). In Oregon and Colorado, the species did not select pure stands of ponderosa pine for roosting but instead used mixed conifer stands where pine was a component (Hayward and Verner 1994). Roosting habits are unknown in the Black Hills, but if range-wide patterns hold true here, the species may roost in spruce or in stands where pine and spruce co-occur. Spruce is not common or well distributed on the Forest. Approximately 25,000 acres of white-spruce stands currently occur on the Forest, mostly at high elevations, on north aspects, and in cool canyon bottoms. It is distributed primarily in the northern and central portions of the western half of the Black Hills. For additional or supporting information on white spruce in the Black Hills, refer to the White Spruce Ecosystems section of this document.

Flammulated owls are nocturnal in their foraging behavior (Johnsgard 1988). They are believed to be the most migratory of all North American owls (Johnsgard 1988). Flammulated owls move south to the tropics when their insect prey becomes scarce in fall and winter (Hayward and Verner 1994).

The flammulated owl appears to be a habitat specialist with low fertility (small clutch size), which is generally an adaptation to a stable environment (Hayward and Verner 1994). This implies that this owl would be sensitive to habitat modification. Loss of mature ponderosa-pine forests may represent the greatest threat to this species in Region 2.

### 4-6.5.1 Direct and Indirect Effects

The flammulated owl is restricted to forests of commercially valuable trees, and in general, its population status is thought to be influenced by timber management practices. Forest management would presumably have little influence in the Black Hills since the species does not appear well established here. If the species is only transient in the Black Hills, effects to

reproduction or survival is likely be very minimal or non-existent. If the species is more common here than currently suspected, or if it breeds here, changes in mature ponderosa pine or spruce stands may have an effect. Changes in the distribution and size of snags (potential nest trees) could also be important.

Alternatives 1, 2, and 4 contain at least one structural-stage objective that can be tied directly to flammulated owl nesting and foraging habitat needs. Objective 207 would strive for least five percent of the forest in a late-successional condition, including MA 3.7 (Late-successional Forest Landscapes). In Alternatives 3 and 6, Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 guide the Forest to provide a mix of mature structural stages in six corresponding MAs. In Alternatives 3 and 6, the mix would result in 55percent of the MAs being managed for structural stages 4A, 4B and 5. Furthermore, these objectives in Alternative 3 would encourage the development and maintenance of large trees by specifying that in structural stages 4 and 5 a percentage of the basal area be at least 15 inches dbh. Specifically, 15 percent of the basal area should be in trees 15-19.8 inches dbh, and 10 percent should be in trees greater than 19 inches dbh. Alternative 6 manages 10 percent of the structural stage 4 acreage for very large tree size (16 inches diameter). All of structural stage 5 by definition is very large tree size for both alternatives. Because flammulated owls are associated with large trees and snags, attainment of these objectives would increase the likelihood that high quality habitat exists for the species.

Objective 3.7-201 under Alternative 3 also encourages all of MA 3.7 to be managed for late-successional structure whereas Alternatives 1, 2, 4 and 6 emphasize that late-successional structure would be present “in some portion of each unit.” Because of this difference, Alternative 3 would be more favorable to the flammulated owl. Abundance would not likely be affected by habitat placement due to the large amount of potentially suitable habitat available on the Forest, which structural-stage objectives would continue to support.

If flammulated owls require spruce stands or a pine-spruce mix for roosting, the amount of potentially suitable habitat would be much lower than what is presented above. This is because spruce is naturally uncommon and patchily distributed on the Forest.

Alternatives 3 and 6 would have the largest direct impact, as more spruce would be removed under the more aggressive approaches to hardwood and riparian restoration. These losses, however, are expected to be balanced by the preference of spruce over ponderosa pine in other areas in Alternative 3. Alternative 6 manages for less spruce than currently exists in an attempt to balance the need for treating areas where spruce has encroached into hardwoods and for fire hazard reduction adjacent to structures. However, spruce habitat will be maintained at levels similar to 1995 estimates.

Alternatives 1, 2, and 4 would also directly remove spruce but to a lesser extent. Overall, however, the amount of spruce (about 25,000 acres) is not expected to change into the future under these alternatives, because only marginal changes at the edges of existing spruce stands are expected. These changes would result from direct management to benefit hardwoods or reduce fire hazard around buildings or from the natural encroachment of spruce in aspen stands.

For more effects to white spruce see Section 3-2.1.2 White Spruce Ecosystem in Chapter 3 of the FEIS.

Next to availability of mature forests, snags would likely be the next most limiting factor to flammulated owl use of an area. Alternative 1 would provide the least assurance that an adequate number and size of snags would be provided for the flammulated owl, whereas Alternatives 2 and 4 would provide the most assurance. Objective 211 and Standard 2301 call for an average of 1.08 hard snags per acre for Alternative 1. In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

Under Alternatives 2 and 4, the Forest would manage for 2 to 4 snags per acre, depending on aspect. All of the snags in Alternatives 2 and 4 must be at least 25 feet tall and 10" DBH, and 25 percent must be at least 20" DBH. This 20" specification closely meets what is known of flammulated owl nesting habitat needs. Three snags per acre are specified in Alternatives 3 and 6; height objectives are the same as in Alternatives 2 and 4, but minimum DBH would be one inch smaller, and 25 percent would be required at 14" DBH instead of 20" DBH. All existing snags greater than 20" DBH would be retained under these latter two alternatives.

The changes described above for any alternative could affect the distribution of owls on the Forest. However, there would likely be little impact on the number, reproduction, or survival of flammulated owls. This is because a large amount of currently unoccupied but suitable habitat would still be available for owl colonization. Furthermore, the low reproductive output of flammulated owls would necessitate many years of breeding before the habitat became fully occupied. Therefore, no alternative would likely stifle the establishment of a flammulated owl population in the Black Hills.

### 4-6.5.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Mount Rushmore National Memorial, Jewel Cave National Monument, Wind Cave National Park, and Custer State Park likely provide additional suitable habitat in the Black Hills. These areas are managed differently than the Black Hills National Forest, particularly regarding timber and recreation. Each of these parks contains a substantial amount of late-successional forests, and provides the vegetative characteristics used by the flammulated owl in other parts of its range (e.g., large snags and open canopy). Spruce is less common in these areas, although some does occur in Custer State Park. Recreational use may be higher in some portions of the parks than in most of the Forest, but the use is generally confined to roads and trails, leaving many suitable areas undisturbed for unaltered reproductive behavior. Despite the high availability of these seemingly high-quality breeding areas, flammulated owls have not been detected within

any of the parks. This indicates that Forest management is probably not an influencing factor of flammulated owl use of the Black Hills.

Privately owned lands within and adjacent to the Forest boundary may also provide suitable habitat. Fire hazard reduction activities are likely to increase on some of these lands in effort to prevent loss of homes from wildfire. This could result in an additional loss of habitat. However, the amount of area within these private lands is relatively small compared to what is on the Forest. It is assumed that urban development will continue on private lands. This will likely increase the importance of habitat located on NFS lands.

The changes described under direct and indirect effects for any alternative could affect the individual owls on the Forest. However, there would likely be little impact on the number, reproduction, or survival of flammulated owls. This is because a large amount of currently unoccupied but suitable habitat would still be available for owl colonization. Furthermore, the low reproductive output of flammulated owls would necessitate many years of breeding before the habitat became fully occupied. Therefore, no alternative would likely stifle the establishment of a flammulated owl population in the Black Hills.

### 4-6.5.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** The flammulated owl occurs in the Black Hills region at the eastern end of its breeding distribution, and few occurrences of this species have been documented on the Forest. At present, there is no information suggesting that flammulated owls are established or breeding in the area.

Management actions under any alternative would likely decrease the amount of potential habitat available to the species, and could change the distribution of the habitat. However, due to the low occurrence of this species on the Forest in relation to the amount of potentially suitable habitat, no alternative is likely to affect the colonization by or establishment of flammulated owls on the Forest. The determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards structural stage and late successional objectives for each alternative. The time required to reach these objectives is dependent on funding and forest growth rates, which are not included in this analysis. As a result, it may take two or more decades to achieve these objectives.

## 4-6.6. Grasshopper Sparrow

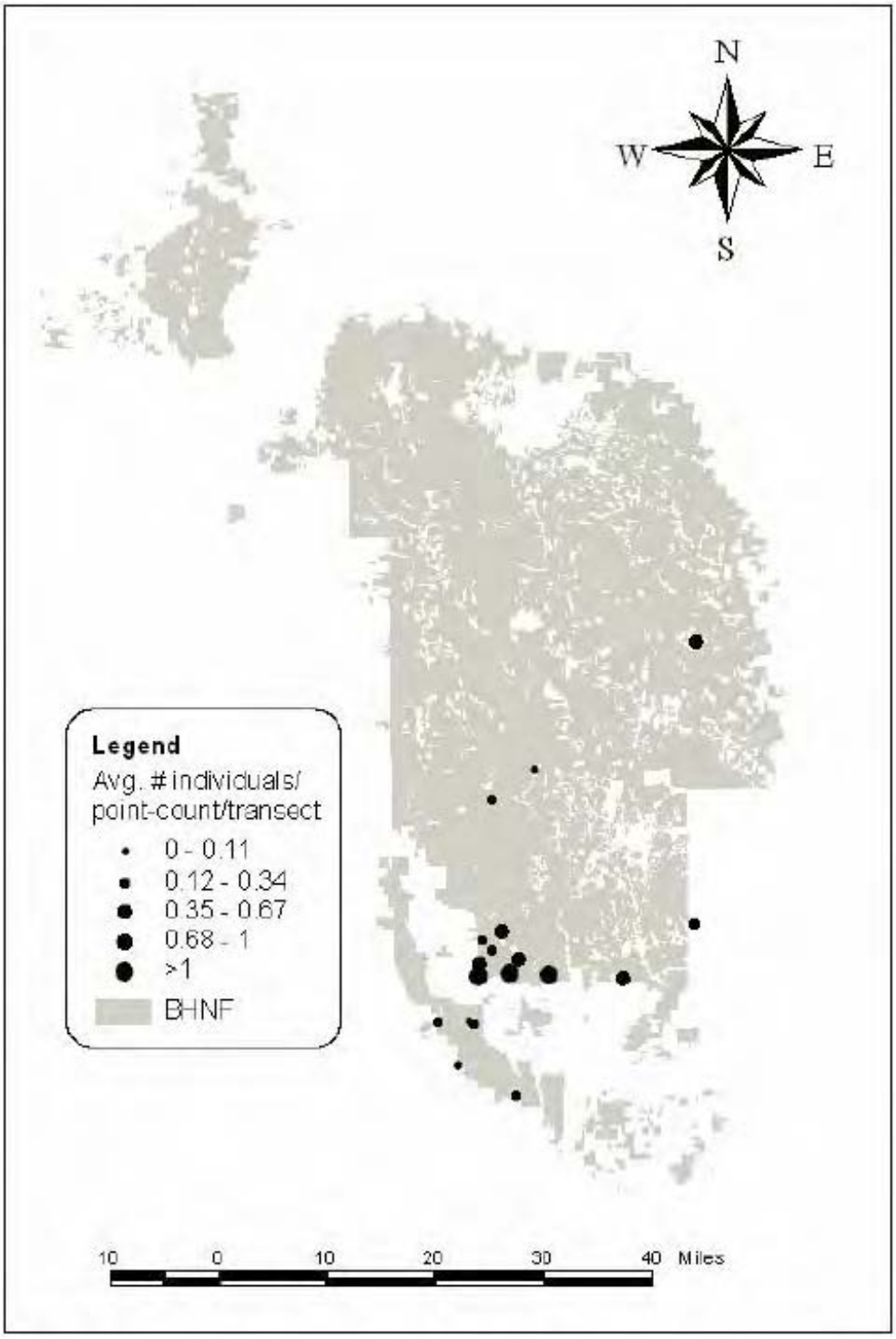
The grasshopper sparrow breeds from southern Canada south through the majority of the United States including northwest portions of Washington, Oregon and California (Sibley 2000). It does not breed in the arid southwest. This species winters in southern United States and Mexico (Sibley 2000). In Wyoming, it breeds mainly in the eastern portion of the state, and occurs almost statewide except in the south central portion (Luce et al. 1999). In South Dakota, there are

breeding records throughout the state, including the Black Hills (Peterson 1995). It is considered an uncommon to common summer resident (South Dakota Ornithologist's Union 1991).

Breeding Bird Survey data shows an average range-wide decline for grasshopper sparrows of 3.7 percent per year between 1966 and 2000. In Wyoming and South Dakota, the declines are 5.3 percent per year and 3.3 percent per year for the same 34-year period, respectively (Sauer et al. 2001). Population declines have been attributed to the loss of habitat by urbanization, conversion of native grasslands to croplands, and intensive livestock grazing (Slater 2004). Panjabi (2005) found them in the highest density in mixed-grass prairie habitat in the Black Hills. Grasshopper sparrow density was recorded as 14.67 birds per $km^2$ in 2002 and 38.4 birds per $km^2$ in 2004 in mix-grass prairie, and will be monitored effectively through the Monitoring the Birds of the Black Hills program (Panjabi 2003, 2005).

The grasshopper sparrow is found in a variety of open grassland types, but appears to be area sensitive, preferring grasslands greater than 20 acres in size (Slater 2004). They may select larger patches to avoid predation associated with edge habitats (Slater 2004). In South Dakota they are primarily found in mixed-grass prairies (Slater 2004). Within these grassland patches, they prefer grasslands of intermediate height and avoid habitats where vegetation is less than 4 inches (Slater 2004). They require some areas of bare ground for foraging and some taller vegetation (tall grasses, forbs, or scattered shrubs) for singing perches (Slater 2004). Grasshopper sparrows can be locally abundant in some prairies, especially where there is a greater proportion of tall grass (Panjabi 2005).

**General abundance and distribution of grasshopper sparrow observations along point transects on the Black Hills National Forest in 2004.**




Source: Panjabi (2005)

High-frequency fires help to maintain an open forest character that contains gaps to support understory herbaceous and shrub communities. Fire can keep the boundaries of conifer and hardwood communities in check by preventing the expansion of trees into grasslands, prairies, and shrubland. Fire suppression in the Forest has resulted in changes in the distribution and structure of herbaceous and shrub communities. At the periphery of the Black Hills, the forest/prairie interface has shifted from being historically higher in elevation to lower in elevation. Some native shrubs and trees have had the chance to become dominant over areas of grasses and forbs. The interior prairies (e.g., Reynolds Prairie) have declined in size due to encroachment of ponderosa pine.

The most recent estimate of area covered by grasslands on the Forest is 110,000 acres. Grassland habitat is distributed as patches at low abundance, and there are gaps where grassland habitat is absent or only present in low abundance, especially in the northern and central Black Hills. However, grassland habitats in the southern Black Hills are typically large enough and close enough to permit dispersal and interaction among subpopulations. For more information on the grassland ecosystem, see Section 3-2.2 Grassland/Shrubland Ecosystem in Chapter 3 of the FEIS.

### 4-6.6.1 Direct and Indirect Effects

In Alternatives 1, 2, and 4, Objective 205 targets restoration of grassland communities (meadow and prairie) by 10 percent over 1995 conditions. Under Alternatives 3 and 6, Objective 205 targets approximately 12,000 acres of prairie grasslands (a 13 percent increase) and 2,400 acres of meadows (a 300 percent increase) for restoration, primarily where pines are encroaching on existing grasslands and meadows.

High intensity livestock grazing can be detrimental to this species, but disturbance from low-to-moderate grazing and light burns can be used as habitat management tools (Nicholoff 2003). Alternative 3 strives to maintain 20 percent of the prairie grasslands with high grass/forb cover (Objective 200-02). Implementation of this objective will likely maintain cover for grasshopper sparrows during the nesting season. Alternatives 1, 2, 4, and 6 lack this direction. In these alternatives, Guideline 2504 and Objective 302 manage for satisfactory range conditions. Guideline 2504 allows livestock removal or relocation as an option in meeting desired range conditions of to target diversity for conservation of emphasis species like the grasshopper sparrow. Livestock grazing does not occur with equal intensity across grazing allotments. Some areas are grazed less due to distance from water, for example. This leads to areas with taller grass in some areas. No changes in livestock grazing levels are proposed in any of the alternatives. Therefore, grasshopper sparrow habitat and populations are not expected to change due to livestock grazing.

All alternatives provide consistent guidance in considering the effects of prescribed burning activities on grassland communities. Guideline 2107 encourages treatment of pines that have encroached on grassland habitat to maintain the composition of grass species under Alternatives 1, 2, and 4. Under Alternatives 3 and 6, this guideline encourages treatment of conifers (not just pine) that have encroached on grasslands. Alternatives 3 and 6 would strengthen these measures by additionally specifying that no more than 60 percent of any contiguous grassland be burned at any time, and that burning activities take place in early spring or fall (Standard 3100-10). This

would ensure food sources were still available and activities were conducted outside the nesting window. This is consistent with the recommendations in the Wyoming Partners in Flight Bird Conservation Plan (Nicholoff 2003).

Under Alternatives 1, 2, and 4, Objective 205 provides for the restoration of grassland and prairie communities across the Forest by 10 percent over 1995 conditions. Alternatives 3 and 6 restoration objectives (205) would result in a slightly more grassland habitat.

If management activities move conditions toward Objective 205, grasshopper sparrow habitat is likely to remain stable or increase in the future for all alternatives. Grasshopper sparrow populations may respond to increases in grassland habitat. Alternatives 3 and 6 take a more aggressive approach to enhancing grassland habitat and would have the most benefit over the long-term. Future distribution will likely be similar to current conditions, with expansion around existing grasslands. Large distribution increases are not expected in the northern and central Black Hills due to the limited availability of suitable sites. Distribution of grasshopper sparrows will likely follow the same pattern. If standards and guidelines are followed, existing grasslands will likely be adequately conserved until grassland restoration objectives are achieved.

Grasslands and shrublands are not the primary focus of the alternatives with a fire-hazard and insect-risk management emphasis. The primary focus for these alternatives is to reduce the threat to At-Risk Communities by reducing the crown-fire hazard in conifer cover types. No significant effects are expected from fire-hazard and insect-risk management.

Grassland habitat will continue to be distributed as patches at low abundance, and there may be gaps where grassland habitat is absent or only present in low abundance, especially in the northern and central Black Hills. However, grassland habitat in the southern Black Hills will typically be large enough and close enough to permit dispersal and interaction among subpopulations. If management activities move conditions toward Objective 205, grasshopper sparrow habitat is likely to be less fragmented in the future for all alternatives. Under all alternatives, there will be adequate habitat for maintaining populations of grasshopper sparrows over the next 50 years.

Grasshopper sparrows are identified as a management indicator species under Alternatives 3, 4 and 6. As such, habitat perameters or populations will be monitored Forest-wide. Monitoring of grasshopper sparrows or their habitat attributes could help identify whether sufficient taller grass is being provided in sufficient patch sizes on prairie grasslands.

### 4-6.6.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Wind cave National Park and Custer State Park likely include suitable habitat for grasshopper sparrows. Bison graze in both parks. Bison and other ungulate grazing may provide additional impacts to grasshopper sparrow habitat.

Privately owned lands within the Forest boundary also provide potential habitat. Resource management by companies and private citizens depends on a number of factors (e.g., desired goals, market prices, development potential, etc.) making it difficult to predict future trends. As a general rule, potential grasshopper sparrow habitat on private lands would occur across the Black Hills. Continued urban development in the Black Hills will likely continue to affect habitat, including grasslands, thereby increasing the importance of habitat on NFS lands over the next 50 years. However, given the conservation measures designed into the alternatives for grassland areas on NFS lands, and the efforts at national parks and monuments, this species is likely to persist in the Black Hills Ecoregion over the next 50 years.

Grasshopper sparrow habitat is likely to remain stable or increase on NFS lands in the future for all alternatives. Cumulative effects are expected to be lowest in Alternatives 3 and 6. Alternatives 3 and 6 take a more aggressive approach to enhancing grassland habitat than the other three alternatives, and would have the most benefit over the long-term. Future distribution will likely be similar to current conditions, with expansion around existing grasslands. Alternative 3 and 6 also include Standard 3100-10, which limits the amount of continuous grasslands that can be burned (prescribed fire) at one time. This provides some areas with higher cover for nesting grasshopper sparrows.

### 4-6.6.3 Determination and rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Grazing or burning of grasslands may affect individuals. Conservation measures for grassland and prairie habitat may benefit individual grasshopper sparrows. However, regional downward trends may persist due to continued grassland habitat loss and degradation off the Forest. All alternatives maintain or enhance grassland habitat by seeking to address pine encroachment. Alternatives 3 and 6 provide the most certainty because they include direction (Objective 200-02, Standard 3100-10) consistent with the Wyoming Partners in Flight Strategic Plan (Nicholoff 2003). This determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction for the various alternatives will be applied or implemented as written.

2. Management will move conditions toward the grassland restoration objective (205) in each alternative.

## 4-6.7. Lewis's Woodpecker

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides a thorough overview of distribution and life history of the Lewis’s woodpecker and is incorporated here by reference.

The Black Hills is at the eastern edge of the Lewis's woodpecker's range (Sibley 2000). In South Dakota, Lewis's woodpecker is considered a locally uncommon summer resident in the Black Hills and a locally rare yearlong resident of adjacent stream bottoms (South Dakota Ornithologist's Union 1991). Breeding has been documented in the Black Hills by Peterson (1995) and Vierling (2004). It is an uncommon summer resident in Wyoming, with breeding records in the east, north, and western portion of the state (Luce et al. 1999). Panjabi (2001, 2003, and 2004) considered Lewis's woodpecker to be rare in the Black Hills, with three individuals observed in 2001, four in 2002, and nine in 2003.

The Lewis's woodpecker is partially migratory, with migration routes and wintering areas varying among years and locations (Anderson 2003). There is no information on migration patterns or wintering areas in the Black Hills.

Breeding Bird Survey (BBS) data suggests that many populations of Lewis's woodpeckers may have declined since the 1960s (Sauer et al. 2001; Tobalske 1997). However, due to the sporadic distribution and cyclical abundance of this species, BBS data may not adequately sample populations. Furthermore, many estimates lack statistical significance (Sauer et al. 2001). Risks to Lewis's woodpeckers include activities that reduce open or old-growth ponderosa-pine forests and snags (e.g., fire suppression and clearcutting) (Anderson 2003). Loss of cottonwood riparian habitat and human encroachment on breeding and wintering habitat are also negative factors (Tobalske 1997), although little cottonwood habitat exists on the Forest.

The Lewis's woodpecker is an edge specialist that prefers open mature pine forests, mature cottonwood forests, and areas with large burned trees (Tobalske 1997). Burned stands are used most often after they have aged several years (Tobalske 1997). A well-developed shrub layer is usually present (Anderson 2003). In the Black Hills, this woodpecker is most often observed in burned pine forests, but it could also be found in mature to late-successional ponderosa-pine stands that have an open canopy (structural stages 4A and some 5). Lewis's woodpeckers prey on flying insects by flycatching or sallying from a perch (Tobalske 1997). They also forage for mast (e.g., acorns and berries), which they often store in bark crevices.

Lewis's woodpeckers typically excavate nest cavities in soft ponderosa pine or cottonwood snags, although they will also re-use cavities made by other woodpecker species. Soft snags are dead trees in advanced stages of decay, and they have typically been dead longer than hard snags. Hard snags usually become soft snags given enough time. Lewis's woodpeckers nest in large snags; review of several studies across the bird's range show snag sizes vary from 12 to 45 inches dbh (Anderson 2003). Snag (greater than 9 inches diameter) densities around nests in burned and logged areas in Idaho were 40 snags per acre and around nests in unlogged areas were 80 snags per acre (Anderson 2003).

### 4-6.7.1 Direct and Indirect Effects

In the Black Hills, the Lewis's woodpecker likely prefers mature to late-successional ponderosa pine and burned areas with large, soft snags. Paper birch, aspen, and willow rather than cottonwood typically dominates riparian areas in the Black Hills; therefore, riparian snag management would likely have no effect on Lewis's woodpecker. The remainder of this effects analysis will focus on mature and late-successional pine habitats.

Structural stage 4A and 5 most closely resemble the preferred nesting, foraging, and roosting habitat for the Lewis's woodpecker. Structural stage 4A contains mature stands with less than 40 percent canopy cover. Structural stage 5 stands were subjectively determined to contain late-successional characteristics and could have any amount of canopy cover. Therefore, some but not all acres in structural stage 5 could provide suitable habitat for the Lewis's woodpecker.

The ecosystem approach in Alternatives 1 and 2 relies on a system of reserves (late-successional areas, late-successional stands, non-development MAs) to provide late-successional habitat across the Forest (structural stage 5). Some of this could provide habitat for the Lewis's woodpecker if the canopy is open enough. Objective 207 seeks to manage at least five percent of the forest for late succession. These late-successional areas include MA 3.7; smaller scale stands identified in the Resource Information System, and other MAs that provide late-successional conditions such as wilderness; this is common to all alternatives. Wilderness (1.1A) and late-successional (3.7) MAs make up about three percent of the Forest.

The ecosystem approach in Alternative 3 is based on a combination of reserve areas and structural-stage objectives. Reserve areas include MA 3.7 and other MAs that provide late-successional conditions, such as wilderness. Alternative 3 also contains habitat objectives that provide habitat across other portions of the Forest (structural stages 4A and 5). In Alternative 3, Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 (structural-stage objectives) provide a desired condition in these MAs. These five MAs would seek to manage for 25 percent of the forested acres in preferred habitat (structural stages 4A and 5). MAs 4.1, 5.1, 5.4, 5.43 and 5.6 make up about 83 percent of the Forest.

The ecosystem approach in Alternative 4 is similar to Alternatives 1 and 2 but includes additional mature forested areas where timber harvest would not occur (structural stages 4C and 5). Additional reserves in Alternative 4 provide a total of 185,000 acres (18 percent) of forested lands that would be managed as late successional.

The ecosystem approach in Alternative 6 is based on a combination of reserve areas and structural-stage objectives. Alternative 6 also contains habitat objectives that provide habitat across the Forest though they are different than Alternative 3. In Alternative 6, Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 (structural-stage objectives) provide a desired condition in these MAs. These five MAs would seek to manage for 30 percent of the forested acres in preferred habitat (structural stages 4A and 5).

Management actions that maintain or increase open canopied late-successional pine would benefit Lewis's woodpecker. Such actions could include prescribed fire and logging that retain snags and large trees (Anderson 2003). Some post-fire salvage logging may be beneficial as long as clusters of burned trees and large snags remain.

If structural stage objectives were met in Alternatives 3 and 6, the amount of habitat (structural stages 4A and 5) would be similar to current conditions. These structural stages would also be present in Alternatives 1, 2 and 4, but the amount that would be present is unknown because Alternatives 1, 2 and 4 do not include an objective for structural stage 4A. Alternatives 3 and 6 offer the most assurance that this habitat will be present in the future. For more information on structural stages, see Section 3-2.1 Forested Ecosystems in the Final EIS.

Snags are a very important component of Lewis's woodpecker habitat. Burned areas are most likely to provide the snag densities preferred by this species. In the event that wildfires would occur, Objective 11-03 would guide value recovery (i.e., salvage logging) under Alternatives 3, 4, and 6. No value recovery would occur under Alternative 4; this would provide maximum potential habitat benefit to the Lewis's woodpecker, as no habitat would be altered. In Alternatives 3 and 6, dead trees would be available for value recovery, excepting 50 percent of the recent (zero to five years) stand-replacing fire acreage Forest-wide, up to 10,000 acres unsalvaged in any given five-year period. As burns age beyond five years, new burns would be added to the unsalvaged quota. Although this objective was designed to assure a continual supply of unsalvaged recent burns, it would also ensure the availability of unsalvaged older burns. Because the Lewis's woodpecker can tolerate some salvage logging, providing both salvaged and unsalvaged areas would likely ensure that suitable habitat exists across the landscape.

Objective 211, Standard 2301a-e, and Standard 2302 (see discussion below) would be applied to snag management in post-fire conditions under Alternatives 1 and 2. These alternatives offer the lowest snag densities in burned habitat.

Snag direction in unburned areas may provide snag habitat between fires, spatially and temporally. Objectives, standards, and guidelines that address snags vary among alternatives (see Objective 211, Standard 23011-e, and Guidelines 2303 through 2306). Snag direction in Alternative 1 calls for an average of 1.08 hard snags per acre, 10 inches in diameter and 15 feet tall. In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

Under Alternatives 2 and 4, the Forest would manage for two to four snags per acre, depending on aspect. All of these snags must be at least 25 feet tall and 10 inches dbh, and 25 percent must be at least 20 inches dbh. Three snags per acre are specified in Alternatives 3 and 6; height objectives are the same as in Alternatives 2 and 4, but minimum dbh would be one inch smaller, and 25 percent would need to be 14 inches dbh instead of 20 inches dbh. Standard 2301a for Alternatives 3 and 6 adds provisions for retaining all existing snags greater than 20 inches dbh unless they are a safety hazard. All alternatives specify that all soft snags should be retained unless they are a safety hazard, but in Alternatives 3 and 6, this would be a standard instead of a guideline. Alternatives 2 and 4 address green tree retention for snag replacement; Alternative 3 and 6 typically aim to meet these standards under structural-stage objectives. In all alternatives, snags densities should be met across relatively large areas (e.g., watersheds or project areas), not necessarily every acre. This is expected to produce some areas with higher snag densities than required and other areas with lower densities.

Lewis's woodpeckers use large snags, and 12 inches is at the low end of the size range used. Alternative 1 would provide the least assurance that this size would occur. All of the other

alternatives aim to provide these larger snags. Big snags come from big trees, so the success of any of these alternatives would depend on the maturity and death of large, old trees.

Large trees are also important for this species because they provide future large snags. Alternative 1 does not include direction for providing large trees on the landscape. Alternatives 2 and 4 contain direction (Guideline 2306) to manage for an average of one 20-inch diameter tree, or the largest size class available, per acre within the associated watershed. This is designed to provide large trees, which may become large snags. Alternative 3 contains direction in the structural-stage objectives (Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204) to maintain 15 percent of the structural stage 4 and 5 basal area in the 15-to-19-inch diameter class, and 10 percent of the structural stage 4 and 5 basal area in the greater-than-19-inch diameter class. Alternative 6 includes direction in the structural stage objectives to manage for 10 percent of the structural stage 4 acreage for a tree size of very large (16 inch diameter or greater). This is intended to provide medium and large diameter trees and snags throughout the mature and late-successional ponderosa-pine type in Alternatives 3 and 6. Alternatives 2, 3, 4, and 6 will likely provide sufficient large trees, well distributed across the Forest.

Lewis' woodpecker populations have not increased in burned habitat resulting from recent fires (Panjabi2001, 2003, 2004, 2005). However, Burned stands are used most often after they have aged several years (Tobalske 1997). Lewis' woodpeckers may increase in the future as recent fires age.

Due to Forest-wide objectives, standards, and guidelines designed to conserve and enhance suitable habitat, the Lewis's woodpecker is likely to persist over the next 50 years. Habitat would remain similar to current conditions under alternatives 3 and 6. Open forest conditions would also be present in Alternatives 1, 2 and 4, but the amount that would be present is unknown because Alternatives 1, 2 and 4 do not include an objective for these conditions. Alternatives 3, 4 and 6 provide direction for post-fire management which is likely to provide the best habitat for Lewis' woodpecker. Alternatives 2, 3, 4, and 6 likely provide sufficient snags well distributed across the landscape. Alternative 1 manages for snag densities below these recent estimates and lacks direction for providing large trees. Because of this, Alternative 1 presents a higher risk to Lewis's woodpeckers.

### 4-6.7.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Lewis's woodpeckers could potentially use habitat in Custer State Park. Foreseeable actions are unknown, though management in Custer State Park will likely result in large trees because of the emphasis on tourism.

Privately owned forestlands within the Forest boundary also provide potential nesting and foraging habitat. Resource management by companies and private citizens depends on a number

of factors (e.g., desired goals, market prices, development potential) making it difficult to predict future trends. Landowners may treat forests for lumber or to reduce fire hazard, which could create habitat if mature stands with closed canopies are opened up.

It is foreseeable that more communities could be designated as ARC with fuel reduction activities potentially occurring around them. It is uncertain how this will result in changes in placement of or levels of treatments in Lewis's woodpecker habitat and how effects would be expected to change.

Alternative 4 is likely to have the least cumulative effects because it has a higher snag density requirement and allows no value recovery of dead trees following a wildfire. Alternatives 3 and 6 is likely to have more cumulative effects than Alternative 4 because they allow some salvage of dead trees following a wildfire (Objective 11-03). Alternative 2 is expected to have more cumulative effects than Alternatives 3 and 6 because it does not include direction for maintaining dead trees following a wildfire and may result in less structural stage 4C and 5. Alternative 1 could result in the most additive effects from management activities on the Forest due to the lower snag density standard, the allowance for habitat capability to decline continuously (Guideline 3201), and the lack of direction on post-fire salvage (11-03).

### 4-6.7.3 Determination and Rationale

**May adversely impact individuals, but is not likely to cause a trend to federal listing or loss of viability in the planning area.** Because the Lewis's woodpecker is at the eastern edge of its distribution and is rare in the Black Hills, it is uncertain how much Forest-management actions would influence the long-term persistence in the area. However, all alternatives would provide habitat in mature, open-canopied condition. Alternatives 3 and 6 are most likely to provide these conditions through the structural stage objectives. Alternatives 3, 4 and 6 provide direction for post-fire management, which is likely to provide the best habitat for Lewis' woodpecker. Alternatives 2, 3, 4, and 6 would likely provide sufficient snags well distributed across the landscape. Alternative 1 would manage for low snag densities and lacks direction for providing large trees. Because of this, Alternative 1 presents a higher risk to Lewis's woodpeckers. This determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards structural stage and late successional objectives for each alternative. The time required to reach these objectives is dependent on funding and forest growth rates, which are not included in this analysis. As a result, it may take two or more decades to achieve these objectives.

## 4-6.8. Loggerhead Shrike

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of distribution and life history for the loggerhead shrike, and is incorporated here by reference.

The loggerhead shrike is a fairly common summer resident in Wyoming and South Dakota, with breeding records occurring over most of both states (Luce et al. 1999, Tallman et al. 2002, Peterson 1995). The bird is rare or casual (out of normal range) in the Black Hills (Tallman et al. 2002, South Dakota Ornithologist's Union 1991). Breeding records occur near the periphery of the Black Hills but not in the interior or at higher elevations (Peterson 1995). Breeding Bird Survey data between 1966 and 2000 indicate significant declines in loggerhead shrikes nearly range-wide (Sauer et al. 2001). In South Dakota, a non-statistically significant decline has been shown (Sauer et al. 2001). In Wyoming, populations appear to have increased 3.7 percent per year between 1980 and 2000 (Sauer et al. 2001).

Regional population declines have been linked to shrub conversion for increased livestock forage, wildfires in arid shrublands, insect (particularly grasshopper) control programs, and grazing pressure that concentrates in arid shrub communities (Beidleman 2000). Wiggins (2005) lists agricultural conversion, degradation or loss of nesting trees and shrubs, and over-grazing as potential threats to the species.

The loggerhead shrike is associated with open habitats that include scattered or clustered shrubs or trees. This includes some types of grasslands, shrublands, and savannas. Wiggins (2005) describes nesting habitat as having trees, shrubs or low bushes and elevated perches for hunting and courtship activities. Foraging habitat includes areas of open, short vegetation with some bare areas and thorny trees or barbed-wire fence for impaling prey (Wiggins 2005). These habitats are limited in the Black Hills but are provided mainly by mixed-grass prairies, mountain mahogany shrublands, and grassy or brushy areas with scattered juniper or ponderosa pine. Scattered pines may be particularly important in the Black Hills (USDA-Forest Service 2000b). A mixing of these habitat types or structures is ideal, as the bird hunts over grasslands that have occasional perch sites (e.g., shrubs), and nests in shrubs or trees (Nicholoff 2003, Terres 1991).

The combination of habitat features described above is distributed primarily along the southern flank of the Black Hills, especially in the southwestern portion. Reynolds Prairie, the Bald Hills, and portions of the Bearlodge Mountains may also provide habitat. Most of the interior Black Hills do not provide suitable habitat because tree density is too high. Two loggerhead shrikes were recorded in 2001 during bird monitoring efforts (Panjabi 2004). None were detected in 2002 and 2003 during similar efforts.

The shrike's diet consists of insects, small birds and mammals, reptiles, and amphibians (Terres 1991). They are the only songbird that regularly preys on other vertebrates (Terres 1991). Shrikes have a unique method of caching prey; they often impale food items onto thorns or other sharp objects for temporary storage (Terres 1991).

### 4-6.8.1 Direct and Indirect Effects

Forest management could affect the loggerhead shrike primarily through treatments in grassland and shrubland habitats in the southern Black Hills and other habitat patches described above. Treatments in meadows or other interior habitats would have no impact on the species since these areas do not provide shrike habitat.

All alternatives have an objective (205) and guideline (2107) to restore (increase) grasslands on the Forest. In Alternative 3, Objective 205 specifically states that restoration would be through removal of pine encroachment. In Alternatives 1, 2, 4, and 6, restoration is not defined, but it would likely be accomplished through pine encroachment treatments as well since Guideline 2107 specifically allows it. More prairie grasslands would be treated in Alternatives 3 and 6 than in Alternatives 1, 2, or 4. In Alternatives 1, 2, and 4, Objective 205 targets restoration of grassland communities (meadow and prairie) by 10 percent over 1995 conditions. Under Alternatives 3 and 6, Objective 205 targets approximately 12,000 acres of prairie grasslands (a 13 percent increase) for restoration, primarily where pines are encroaching on existing grasslands.

Objective 5.1A-205 encourages pine encroachment removal within grasslands and shrublands of MA 5.1 in Alternatives 3 and 6. There is little overlap of this MA with suitable shrike habitat, but a small amount does occur at the north end of the Elk Mountains and within the Bearlodge Mountains. The Elk Mountain overlap has recently burned (2001 Elk Mountain II Burn), and live pines are generally no longer present.

Prairie restoration could cause a decrease in shrike habitat if scattered pines are removed from grasslands that serve as shrike habitat. It may cause an increase if entire margins of prairies are treated, because this would merely move back the forested edge while increasing prairie size. Site-specific analyses would ultimately determine which type of treatment would be more common and influential to shrikes.

Objective 200-02 (Alternative 3) aims to maintain 20 percent of prairie grasslands with high grass/forb cover. Diversifying grassland conditions could increase prey diversity, which in turn could benefit shrikes. However, some literature suggests that sparser grasslands are preferred those with denser cover (Johnson et al. 1998).

Prescribed fire could be used to meet any of the above grassland objectives. Fire can promote herbaceous growth, and benefit shrikes as long it does not completely eliminate shrubs (Johnson et al. 1998). Standard 3100-10 (Alternatives 3 and 6) mandates that no more than 60 percent of any contiguous grassland be burned at any one time, and directs burning to occur during early spring or fall. This would decrease the chance that fire would be applied in all suitable shrike habitat at any one time, and help ensure a mosaic of vegetative conditions exist. It would also decrease the chance that nests would be impacted by fire. Shrikes breed from April through July (Terres 1991).

Shrublands are also important areas for shrikes. Objective 202 promotes the conservation of mountain mahogany stands in all alternatives. Objective 202a and 202b promote structural and age diversity within these shrublands, and again applies equally to all alternatives. Objective 202c promotes maintaining ponderosa pine in the mahogany stands, but would only apply to Alternatives 1, 2, and 4. This objective is dropped in Alternatives 3 and 6 to allow removal of pine encroachment.

Objectives 202, 202a, and 202b would likely benefit the loggerhead shrike because they would maintain or promote diverse mahogany shrublands where they currently occur. Maintaining pine in mahogany stands (Objective 202c) may result in better habitat for the shrike than if pines were

removed, because scattered pines may be an important component in the Black Hills. Therefore, Alternatives 1, 2, and 4 may have less impact in this respect when compared to Alternatives 3 and 6. However, it should be noted that there are no objectives, standards or guidelines to direct the removal of pine from shrublands in Alternatives 3 or 6, with the exception of Objective 5.1A-205.

Objective 11-04 would encourage and conserve the establishment of shrubs in moderate-to-high-intensity burn areas the first five years following a wildfire. This objective would apply to Alternatives 3, 4, and 6, but not 1 or 2. Although the intent of this objective is to stabilize soils, it could benefit shrikes if the burned areas were relatively large and quickly re-vegetated with a mix of grasses and shrubs. Any benefits from this objective could be short-lived if different management was applied after five years.

Guideline 2208 would discourage altering age classes of shrubs in a planning unit by no more than 25 percent within a 10-year period. This would apply only to Alternatives 1 and 2; it was not included in any new alternatives because shrub age is not easily tracked. The presumed intent of the guideline was to prevent widespread loss of mature shrubs or conversion to all young shrubs. This guideline would minimize the chance that all suitable shrike habitat would be treated at any given time. However, it would not be likely that such large treatments would occur even without this guideline.

Wiggins (2005) noted that grazing could adversely affect loggerhead shrike habitat. Wiggins (2005) suggests that in mixed grass prairies, such as are found in the Black Hills, light to moderate grazing may improve foraging habitat for shrikes. However, he placed the Black Hills in the area suggesting light or no grazing. Any impact to the loggerhead shrike would not vary among the alternatives, as none of them include any shift in grazing intensity from current levels.

Guideline 2505c limits browsing (grazing) on shrubs to 40 percent in all alternatives. This would help maintain shrubs wherever they are present, and prevent widespread hedging. Shrikes often nest in shrubs; so presumably hedging would be detrimental.

### 4-6.8.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Wind cave National Park and Custer State Park likely include suitable habitat for northern harriers. Bison graze in both parks. Bison and other ungulate grazing may add to effects from grazing on the Forest.

Grassland habitats with shrub interspersions are fairly common adjacent to the Forest boundary, and increase in dominance as one travels away from the Forest. Unlike on the Forest, these areas are extensive and provide tracts of potentially suitable loggerhead shrike habitat. Although some of these lands may be impaired by intensive crop production, shrikes are relatively common here

(Tallman et al. 2002, Luce et al. 1999). Privately owned lands within the Forest boundary also provide potential habitat. Resource management by companies and private citizens depends on a number of factors (e.g., desired goals, market prices, development potential, etc.) making it difficult to predict future trends. As a general rule, potential shrike habitat on private lands occurs in the Black Hills. Continued urban development in the Black Hills will likely continue to affect habitat, including grasslands, thereby increasing the importance of habitat on NFS lands. However, given the conservation measures designed into the alternatives for grassland areas on NFS lands, and the efforts at national parks and monuments, this species is likely to persist in the Black Hills Ecoregion over the next 50 years.

Alternatives 3 and 6 would provide the most cumulative benefits to shrikes. More prairie grasslands would be enhanced in Alternatives 3 and 6 than in Alternatives 1, 2, or 4. In Alternatives 1, 2, and 4, Objective 205 targets restoration of grassland communities (meadow and prairie) by 10 percent over 1995 conditions. Under Alternatives 3 and 6, Objective 205 targets approximately 12,000 acres of prairie grasslands (a 13 percent increase) for restoration, primarily where pines are encroaching on existing grasslands.

### 4-6.8.3 Determination and Rationale

**May adversely impact individuals, but is not likely to cause a trend to federal listing or loss of viability in the planning area.** Loggerhead shrikes are rare on the Forest, but occur in grassland habitats that are mixed with or in close proximity to shrubs or scattered trees. All alternatives would maintain or restore grass and shrub communities, which would generally be beneficial to shrikes. However, Alternatives 3 and 6 would intensively manage (reduce) pine encroachment to accomplish restoration. This could cause a decrease in shrike habitat suitability compared to Alternatives 1, 2, and 4. Fire could be applied in any alternative, but Alternatives 3 and 6 would be better for shrikes because they would prohibit prescribed fire over large contiguous areas, and allow fire use outside most of the shrike's breeding season. All alternatives provide measures to prevent overgrazing by livestock. This determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the grassland restoration objective (205) in each alternative.

## 4-6.9. Mountain Plover

Historically, the mountain plover was a widespread summer resident of short-grass prairies and shrub-steppe of the western Great Plains from Montana to New Mexico and Texas. During the past century, the conversion of native prairies to croplands has significantly reduced the availability of suitable habitats, producing a significant decline in the continental population. Recent population trend information indicates a drastic decline in the continental population of mountain plovers (Knopf 1996). This population decline has been concurrent with the reduction in the number of herbivorous mammals with which it is closely associated, such as bison, elk, pronghorn and prairie dogs, and resultant historical changes in the character of native grasslands

(Knopf 1994). Mountain plovers have a localized distribution within their present breeding range compared to their more widespread historical distribution (Dinsmore 2003). Most birds winter in the Central, Imperial, and San Joaquin valleys of California (Knopf 1996).

In February 1999, the mountain plover was proposed for listing as a threatened species under the ESA (USDI Fish and Wildlife Service 1999b). In September 2003, the USFWS withdrew its proposed rule to list the plover, indicating that threats to the species were not as significant as previously believed, and that current data did not indicate that the threats to the species and its habitats are likely to endanger the species in the foreseeable future (USDI Fish and Wildlife Service 2003).

Mountain plovers have fairly specific breeding habitat requirements, preferring flat, open areas with very short grass and scattered cactus (Graul 1975). Vegetation on short-grass prairie sites is less than 4 inches tall, and nest sites in the shrub-steppe are usually on active prairie dog towns. Where taller grasses are dominant, the species is restricted to heavily grazed sites (Knopf 1996); intensive grazing is therefore beneficial for mountain plovers (Knowles et al. 1982). Throughout their range, mountain plovers selectively nest on active prairie dog colonies, especially those of the black-tailed prairie dog (Knowles et al. 1982, Olsen-Edge and Edge 1985, Dinsmore 2003). The highest densities of nesting plovers occur in prairie dog colonies in Montana (Knowles et al. 1982). In addition to using areas disturbed by prairie dogs or livestock, plovers have also been found on disturbed areas around oil drill pads and pipelines.

Mountain plovers have been observed in the general vicinity of the Wyoming Black Hills, with nesting documented in the southern half and north central portion of Wyoming (Luce et al. 1999). Mountain plovers were formerly rare breeders in southwestern South Dakota, and they are currently classified as accidental in South Dakota (Tallman et al. 2002). There is one modern (1977) record of a mountain plover in Bennett County South Dakota (the south central portion of the state), and a few relatively recent, unconfirmed reports of the species (Tallman et al. 2002).

The current breeding distribution of mountain plovers does not include the Black Hills region (Dinsmore 2003 p. 11). Disturbed and low growing prairie grassland habitats suitable for mountain plover are currently rare within the Forest. Prairie dog towns, which are considered potential mountain plover habitat, currently occupy 265 acres in the southern portion of the Forest on the Hell Canyon Ranger District (USDA-Forest Service 2003j). Additional potentially suitable habitats of large, flat, short-grass prairie or heavily grazed sites may occur outside prairie dog colonies, but would be quite rare and limited in extent.

### 4-6.9.1 Direct and Indirect Effects

The grassland ecosystem in general would be managed according to Objective 205 and Guideline 2107, which provide guidance for restoring grassland habitats by treating encroaching pine. In Alternatives 1, 2, and 4, Objective 205 targets restoration of grassland communities (meadow and prairie) by 10 percent over 1995 conditions. Under Alternatives 3 and 6, Objective 205 targets approximately 12,000 acres of prairie grasslands (a 13 percent increase) for restoration, primarily where pines are encroaching on existing grasslands.

The extent to which Objective 205 would benefit black-tailed prairie dog habitat, and thus mountain plover habitat, is limited by the amount of potentially suitable prairie dog habitat (with non-rocky soils conducive to burrowing). The majority of restoration efforts would likely occur on soil types that are not suitable for prairie dogs, although some treated sites may be potentially suitable for mountain plover in the absence of prairie dogs. Implementation of these restoration efforts, regardless of alternative, would not significantly increase the amount of suitable mountain plover habitat on the Forest.

Since prairie dogs, mountain plovers, and other associated species prefer short grass conditions, Objective 200-09 promotes low grassland structure in the vicinity of prairie dog town in Alternative 3. In Alternative 6, Objective 200-09 manages for 200 to 300 acres of prairie dog towns on the Forest in at least 3 separate towns. This allows for some fluctuation in prairie dog towns due to natural drought and wet cycles. No such guidance is provided in Alternatives 1, 2, or 4.

Due to the strong association of nesting mountain plovers with prairie dog towns, guidance that protects or enhances prairie dog habitat will benefit potential mountain plover habitat. Alternatives 2 and 4 emphasize maintenance of prairie dog towns (Standard 3118). It is uncertain this can be achieved during wet periods. Alternative 3 prohibits major soil disturbing activities in existing prairie dog towns. Alternatives 3, 4, and 6 provide more extensive protection measures for prairie dog towns or occupied mountain plover habitat by requiring new structures in such areas be designed to discourage avian predators (Standard 3100-03).

Two standards in Alternatives 3, 4, and 6 are designed to reduce impacts to mountain plover nesting areas, should they be discovered on the Forest. Standard 3100-06 prohibits development of new facilities within 0.25 miles of known nests, and Standard 3100-07 prohibits construction (roads, water impoundments, etc.), prescribed burning, well drilling, and several other activities within 0.25 miles of nests between March 15 and July 31.

Prairie dog towns have remained stable or increased on the Forest (USDA-Forest Service 2001c, 2003j), and are expected be maintained or enhanced by the above measures. In the absence of sylvatic plague, prairie dogs and thus potentially suitable mountain plover habitat are expected to persist on the Forest over the next 50 years, although they will continue to be limited. Since mountain plovers are not known to breed in or near the Forest, no direct or indirect impacts to this species are anticipated.

### 4-6.9.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Adjacent to the Forest, Wind Cave National Park and Custer State Park contain and manage for prairie dog towns that provide limited, but suitable habitats for mountain plover. While the extent of the colonies on adjacent federal lands is known, estimates of suitable prairie dog or mountain

plover habitat on private lands are not available. Due to the extremely limited amount of suitable habitat within the Black Hills, it appears unlikely that a self-sustaining, viable population of mountain plovers would re-establish itself in the foreseeable future.

There would be no cumulative effect to the mountain plover given the absence of direct or indirect effects.

### 4-6.9.3 Determination and Rationale

**No impact.** There is very little suitable mountain plover habitat on or near the Forest, and mountain plovers have not been documented in the vicinity. Forest-wide goals, objectives, standards, and guidelines across all alternatives require at a minimum the maintenance of current grassland habitats, and Alternatives 2, 3, 4, and 6 offer varying degrees of increased prairie dog town protection. Although grassland habitats in general would be maintained or increased across the Forest, the proportion of grasslands that provide suitable plover habitat (e.g. short, disturbed grasslands) would remain essentially unchanged for all alternatives. Alternatives 3, 4, and 6 provide measures to reduce disturbance to nesting mountain plovers should they be discovered on the Forest. This determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the grassland restoration objective (205) in each alternative.

## 4-6.10. Northern Goshawk

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of northern goshawk distribution and natural history, and is incorporated here by reference.

### 4-6.10.1 Population Status

The northern goshawk is considered a common resident of coniferous forests in Wyoming (Luce et al. 1999). In South Dakota, this forest raptor is a rare to uncommon permanent resident, especially in the higher elevations of the Black Hills (South Dakota Ornithologist's Union 1991). Known nest densities are generally higher in the northern and central hills (USDA-Forest Service 2001a). There are 90 known goshawk territories on the Forest. The 1996 Forest Plan EIS estimates 30 territories may be active in any given year (USDA-Forest Service 2001a p. 128).

Goshawks are difficult to monitor because of their secretive nature and use of alternate nests. Goshawk monitoring on the Forest consists of monitoring known nests for nesting activity. Goshawk nest monitoring in 2003 showed that 34 percent of monitored territories (25 of 73) were confirmed active (USDA-Forest Service 2004a). Some territories monitored may have been active but were not confirmed, because goshawks are secretive and difficult to detect and often use alternate nests. Additional pairs likely occur on the Forest but have not been detected for the same reason.

Goshawks exhibit a variety of movement patterns. Limited information suggests that the goshawk is a partial migrant, usually moving less than 300 miles (Kennedy 2003). Juveniles are also known to disperse up to 100 miles from their natal nest area (Kennedy 2003). While the Black Hills population is somewhat isolated, there may be interactions with populations outside the Black Hills.

Recent fire and adverse weather have damaged or destroyed 11 known nests since 1998, most of which occurred as a result of the Jasper Fire in 2000 (USDA-Forest Service 2004a). In most cases, suitable nesting habitat and known alternate nests were unburned nearby. One territory was almost completely consumed by the Jasper Fire, and the territory is assumed to have been abandoned or is inactive. Four new territories were discovered in 2003 (USDA-Forest Service 2004a).

There is insufficient information to determine population trends in Region 2 or North America (Kennedy 2003).

### 4-6.10.2 Habitat Relationships

Goshawks typically nest in relatively dense (dependent on forest type) forest areas and use a mosaic of structural stages for foraging within their home range (Kennedy 2003).

A wide variety of birds and mammals are taken as prey, with no single type dominating, so it is important to maintain habitats for multiple prey species (USDA-Forest Service 2001a). Based on interviews with goshawk experts (USDA-Forest Service 2000b), a wide variety of potential prey may be consumed, but large woodpeckers (e.g., northern flickers), tree squirrels, grouse, rabbits, hares and jays are likely the most important species.

Typical nest areas for goshawks in the northern Rocky Mountains are single storied, mature or late-successional coniferous forest, with high canopy closure, clear forest floors, on north-facing moderate slopes (Hayward and Escano 1989; Squires and Ruggiero 1996). Goshawks tend to select stands that have relatively large trees and relatively high canopy closure (Kennedy, 2003). In the Black Hills, the goshawk nests in mature, dense, or moderately dense stands of large-diameter pine but occasionally nests in other species including mature quaking aspen, depending on site conditions (USDA-Forest Service 2001a). Reynolds et al. (1992) characterized the nest area as mature and old stands with canopy closure greater than 50 percent. Ponderosa-pine structural stages 4C and 5 (dense mature forest and late-successional), at least 30 acres in size, likely best meet these conditions in the Black Hills. There are approximately 136,000 acres of ponderosa-pine structural stages 4C and 5 on the Forest, comprising approximately 13 percent of the ponderosa pine forested acres. Structural stage 4B (mature forest with 40 to 70 percent canopy closure) may also provide some additional nesting habitat. There are 302,676 acres of ponderosa-pine structural stage 4B on the Forest, comprising approximately 29 percent of the ponderosa pine forested area.

According to Reynolds et al. (1992), the post-fledging family area (approximately 420 acres) and the foraging area (approximately 5,400 acres) typically includes a diversity of forest types and conditions including stands of young, mid-aged, mature, and late-successional trees. At least 40 percent of the home range is recommended to be comprised of mature or late-successional stands

with greater than 40-to-50 percent canopy closure, which roughly equates to structural stages 4B, 4C, and 5 on the Black Hills. There are approximately 438,000 acres of ponderosa-pine structural stages 4B, 4C and 5 on the Forest, comprising approximately 42 percent of the ponderosa pine forested acres.

Greenwald et al. (2005) reviewed several telemetry studies completed since Reynolds et al. (1992). Most of the studies found that goshawks selected for stands with greater than 40 percent canopy closure and higher densities of trees over 15 inches in diameter (Greenwald et al. 2005). Mature or old trees with greater than 40 percent canopy closure roughly equates to Structural stages 4B, 4C and 5 on the Black hills. Trees over 15 inches in diameter are similar to the tree size of "very large" in the Forest vegetation database (See Section 3-2.1.1 Ponderosa Pine Ecosystem in Chapter 3 of the Final EIS). Greenwald et al. (2005) noted that telemetry studies do not tell us how much of this habitat is required in a goshawk home range. Some of the studies they reviewed found that landscapes around occupied nest sites had more than the 40 percent suggested by Reynolds et al. (1992). Greenwald et al. (2005) recommend protecting existing mature and old-forest characteristics, allowing these forests to develop in proportions similar to historic conditions, and prohibiting large reductions in canopy closure.

Snags, downed logs, and woody debris are an important component of the post-fledging family and foraging habitat. Typically, two snags per acre and three downed logs per acre are desired in the ponderosa-pine forest type (Reynolds et al. 1992). Nicholoff (2003) recommends three snags per acre for goshawks. DeBlander (2002) estimated 2.7 snags per acre over 11 inches in diameter and estimated 0.3 snags per acre over 19 inches in diameter. No definition of height is given. For more information on snag densities, see Section 3-2.1 Forested Ecosystems in Chapter 3 of the FEIS. Wildfire and insects since 1999 have created additional snags, but amounts have not been quantified. As a result, there are likely more snags on the landscape than is represented above.

Downed logs and woody debris are also an important component of goshawk habitat. Reynolds et al. (1992) suggests three large downed logs per acre (at least eight feet long) in ponderosa-pine habitats. Nicholoff (2003) recommends five downed logs per acre at least eight feet long.

Little is known about goshawk winter habitat use in the Black Hills. Much of the winter knowledge comes from Europe and its applicability to North America is uncertain. Goshawks may maintain a close association with the breeding home range but winter home ranges may be larger, and birds will winter in habitat not used for nesting (Kennedy 2003). Goshawks may also move short distances during the non-breeding season (Kennedy 2003).

Reynolds et al. (1992) presents a potential framework for goshawk management direction, but it should not be applied exactly in other forests because forest conditions may be different (Kennedy 2003). For example, the Black Hills likely has a shorter growing season and different rainfall patterns than the Southwest. Still, Reynolds et al. (1992) provides a logical starting point since prey species are similar in the Black Hills. Nest area management direction in all alternatives (Standards 3108 and 3109) is based on Reynolds et al. (1992). Although they vary to some degree between alternatives, all alternatives provide a total of 180 acres around historically active nests. The Post-fledging family area direction in Alternatives 2 and 4 (Guideline 3114) is based on Reynolds et al. (1992), but the structural stage definitions were modified during the Phase I Forest Plan Amendment to fit the vegetation data from the Black Hills. The concept of

structural stage objectives in Alternatives 3 and 6 came from Reynolds et al. (1992). However, the structural stage definitions used on the Black Hills does not match those used in Reynolds et al. (1992), making it difficult to crosswalk between the two definitions. While the recommendations in Reynolds et al. (1992) were considered during the development of structural stage objectives, other factors also influenced the objectives such as other species needs and other proposed objectives (e.g., fire and fuels objectives).

### 4-6.10.3 Direct and Indirect Effects

#### Ecosystem Approach by Alternative.

An important aspect of managing for goshawks is an ecosystem approach that provides nesting, fledgling, and foraging habitat well distributed across the Forest. Goshawks are closely associated with the ponderosa pine forested ecosystem in the Black Hills. Each alternative takes a different ecosystem approach.

In Alternatives 1 and 2, Objective 207 seeks to manage at least five percent of the Forest for late succession. These late-successional areas include MA 3.7; smaller scale stands identified in the Resource Information System, and other MAs that provide late-successional conditions such as wilderness. This late-successional habitat will serve as nesting habitat across the landscape. Alternatives 1 and 2 do not contain direction for maintaining dense mature ponderosa pine (structural stage 4C), which also serves as nesting habitat. Alternatives 1 and 2 do not contain structural-stage objectives that provide for moderately dense mature pine habitat (structural stage 4B) and a diversity of other structural stages. Alternative 1 includes direction that a project should not decrease habitat capability more than 10 percent (Guideline 3201). This guideline is deleted in Alternative 2.

The ecosystem approach in Alternative 3 is based on a combination of late successional areas and structural-stage objectives. Late successional areas include MAs 3.7 and other MAs that provide late-successional conditions, such as wilderness. Alternative 3 also contains habitat objectives that provide nesting and foraging habitat across other portions of the Forest. In Alternative 3, Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 (structural-stage objectives) provide a desired condition in these MAs (80 percent of the Forest). These five MAs would seek to manage for 15 percent of the forested acres in conditions suitable for goshawk nesting habitat (structural stages 4C and 5). This is in addition to habitat provided in other MAs such as wilderness, late-successional areas (MA 3.7), and recreational MAs. The above-mentioned objectives in MAs 4.1 and 5.1 would also seek to manage for 50 percent of the forest in mature forest with greater than 40 percent canopy closure (structural stages 4B, 4C and 5). MAs 5.4, 5.43, and 5.6 would seek to manage for 35 percent of the forested acres in these conditions. This is designed to contribute to nesting habitat and provide foraging habitat across the Forest and in post-fledging family areas. The structural-stage objectives listed above also seek to manage for a diversity of other structural stages within these MAs. Continuous silvicultural activity will be needed to enhance and maintain the desired mix of structural stages for goshawk habitat as noted in Shepperd et al. (2002).

The ecosystem approach in Alternative 4 is similar to Alternatives 1 and 2 but includes additional mature forested (Structural stage 4C and 5) areas where timber harvest would not

occur (Objective 207). Additional mature forested areas in Alternative 4 provide a total of 185,000 acres (18 percent) of forested lands that would be managed as dense, mature and late succession pine (structural stages 4C and 5). This would serve as nesting habitat and contribute to post-fledging family areas and foraging habitat across the Forest. Alternative 4 does not contain structural-stage objectives that provide for moderately dense mature pine habitat (structural stage 4B) and a diversity of other structural stages.

The ecosystem approach in Alternative 6 is based on a combination of late successional areas and structural-stage objectives. Late successional areas include MAs 3.7 and other MAs that provide late-successional conditions, such as wilderness. Alternative 6 also contains habitat objectives that provide nesting and foraging habitat across the Forest though they are different than Alternative 3. In Alternative 6, Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 (structural-stage objectives) provide a desired condition in these MAs (80 percent of the Forest). These five MAs would seek to manage for 10 percent of the forested acres in conditions suitable for goshawk nesting (structural stages 4C and 5). This is in addition to habitat provided in other MAs such as wilderness, late-successional areas (MA 3.7), and recreational MAs. The above-mentioned structural-stage objectives would also seek to manage for 35 percent of the forested area in mature forest with greater than 40 percent canopy closure (structural stages 4B, 4C, and 5). This is designed to contribute to nesting habitat and provide foraging habitat across the Forest and in post-fledging family areas. The structural-stage objectives listed above also seek to manage for a diversity of other structural stages within these MAs, which is consistent with the approach suggested in Reynolds et al. (1992) and Nicholoff (2003). Continuous silvicultural activity will be needed to enhance and maintain the desired mix of structural stages for goshawk habitat as noted in Shepperd et al. (2002).

Even though goshawks are not cavity dependant species, they depend on cavity nesters as prey. The ecosystem approach for each alternative also contains a strategy for maintaining snags across the landscape (Objective 211). Alternative 1 seeks to maintain 1.08 snags per acre at least 10 inches in diameter and at least 15 feet tall. This is further supported by Standard 2301. Alternatives 2 and 4 seek to maintain two snags at least 10 inches in diameter and 25 feet tall per acre in ponderosa pine on north and east facing slopes and four snags per acre on south and west facing slopes. This is also supported by Standard 2301. Alternatives 3 and 6 seek to maintain three snags per acre at least 9 inches in diameter and at least 25 feet tall. This is further supported by Standard 2301 that requires that all snags over 20 inches be retained unless they are a safety hazard and requires that all snags be retained unless they are a safety hazard if the snag densities are below the snag objective (211) within project areas.

All alternatives strive for 50 linear feet of downed logs (at least 10 inches diameter) in ponderosa pine forested areas.

## Species Specific Approach by Alternative

In addition to the above ecosystem approach, each alternative also contains a species-specific approach to goshawk management. Standards 3108 through 3114 provide species-specific direction for conservation of active and historically active goshawk nest sites and territories.

Alternative 1 requires the limitation of activities in at least three goshawk nest stands and in at least three replacement nest stands (approximately 30 acres each) in each historically active territory. This is consistent with Reynolds et al. (1992) in conserving habitat around goshawk nests (180 acres). In Alternative 1, Standard 2111 is designed to minimize human-caused disturbances not present during nest initiation in active goshawk nest areas from March 1 through September 30. This is designed to reduce disturbances during the nesting period. Guideline 3112 suggests that treatments in goshawk nest stands be designed to conserve or enhance site conditions. Guidelines 3113 and 3114 provide guidance on treatments allowed within fledgling habitat. Fledgling habitat is assumed to be the post fledging family area used by Reynolds et al. (1992). These guidelines reduce disturbance and suggest that treatments be designed to enhance prey species habitat, structural, and compositional diversity. However, Guidelines 3113 and 3114 provide little insight into the desired prey species habitat, structural, and compositional diversity.

Alternatives 2, 3, and 4 require that nest areas around historically active nests be identified that will be managed to maintain or enhance nesting habitat values. In Alternatives 2, 3, and 4, nest areas are defined as 180 acres of the best suited nesting habitat within one-half mile of the nest. In Alternative 6, nest areas are defined as 180 acres of the best-suited nesting habitat within one-half mile of the nest and greater than 300 feet from buildings (to allow for defensible space for fires). In Alternatives 2, 3, 4, and 6, Activities within these stands are limited to those that maintain or enhance the stands value for goshawks.

Alternatives 2 and 4 contain specific direction (Standard 3114) for managing goshawk fledgling habitat. Fledgling habitat is defined as 420 acres around historically active and active goshawk nests similar to Reynolds et al. (1992). Desired conditions are a balance of structural stages in fledgling habitat.

Alternatives 3 and 6 do not include specific direction for fledgling habitat as suggested in Reynolds et al. (1992). In Alternatives 3 and 6, the conditions for fledgling habitat are included in the ecosystem approach (discussed above), which seeks to meet the fledgling habitat requirements on an ecosystem scale.

All alternatives provide direction (Standard 3111) to avoid disturbances during the periods suggested by Nicholoff (2003). Alternative 1 does not stipulate a distance from the nest. Alternative 2 stipulates this area as within one-fourth mile from the nest, which is consistent with Nicholoff (2003). Alternatives 3, 4, and 6 extend the distance to one-half mile from the nest to be consistent with US Fish and Wildlife Service guidelines (US Fish and Wildlife Service 1999a).

## Effects of Management Actions

Forest management can impact goshawk habitat. Activities that create open forest conditions may favor competitors. Prescribed fire and thinning may improve or degrade habitat depending on the treatment type. Activities that open up understory vegetation or create snags, downed logs and other conditions may improve habitat (Kennedy 2003). Management that creates large areas with reduced canopy may lower the quality of goshawk habitat (Kennedy 2003). This amendment does not prescribe specific activities nor does it identify where and when management activities will take place. It focuses on the desired conditions of the Forest through

goals and objectives and implementation of standards and guidelines. Therefore, the discussion of affects below focuses on the conditions under each alternative that are expected to occur if these objectives, standards and guidelines are implemented.

The predominant landscape of the 1800s was likely more open and more diverse than the current forest. Under conditions of a century ago, fires kept the pines in various stages of development and the landscape open with a diverse mosaic of vegetation ranging from grasslands to stands of mature pine and higher occurrence of hardwoods. The areas of mature pine presumably contributed to goshawk habitat. Fire exclusion, fire suppression, and resource management have influenced forest composition since permanent European settlement began in 1874. Comparing 1874 with modern photographs shows that in nearly every case many more trees are growing now over vast areas of the Black Hills. These trees tend to be smaller and growing closer together. For more information on fire history, see Section 3-7 Natural Disturbance Processes in Chapter 3 of the Final EIS.

None of the alternatives seek to return the Black Hills to historic conditions. However, they do strive to manage for some of the conditions that occurred historically. Objective 207 in Alternatives 1, 2 and 4 seek to manage for the mature pine forests that occurred in historic times. The structural stage objectives in Alternatives 3 and 6 manage for mature pine areas, but also manage for other structural stages that likely formed the diverse mosaic of vegetation that occurred historically.

An ecosystem strategy built upon reserve areas alone such as Alternatives 1, 2, and 4 may not be as desirable in a fire influenced ecosystem such as occurs in the Black Hills. The reserve areas will likely be susceptible to fires and insects and may be lost over time. If this occurs, the reserve areas will take a long time to return to late-successional conditions. Shepperd et al. (2002) noted that continuous treatments are necessary to maintain or enhance goshawk habitat. This adds an element of risk to the strategies in Alternatives 1, 2, and 4 whereas a strategy such as Alternatives 3 and 6, which combines the reserve areas in Alternatives 1, 2, and 4 with a desired set of conditions in other portions of the Forest, is more appropriate for a dynamic ecosystem such as the Black Hills. If areas are lost to fires or insects, some of the desired habitat conditions can shift around the landscape to compensate for the loss.

Because goshawks are territorial, they tend to have regular spacing across the landscape. Late successional areas in all alternatives may not provide the desired habitat elements dispersed across the landscape. In other words, only a certain number of goshawks may use the areas because of their territoriality. This may limit the usefulness of these late successional areas in all Alternatives. The structural stage objectives in Alternatives 3 and 6 increase the likelihood that habitat elements will be dispersed across the Forest. Because Alternatives 1, 2 and 4 rely only on late successional areas, there may be more uncertainty that this will occur.

Section 3-2.1 Forested Ecosystems in Chapter 3 of the FEIS displays the expected acres of structural stages for each alternative if structural stage objectives and late successional objectives are achieved. Moderately dense mature forest habitat (structural stages 4B, 4C, and 5) contributes to nesting and foraging habitat across the landscape and in post-fledging family areas. The amount is expected to be similar to existing conditions for Alternative 3 and decrease in Alternative 6. Moderately dense ponderosa pine acres in Alternative 3 are expected to remain

at 42 percent of total ponderosa pine acres, similar to the 40 percent recommended by Reynolds et al. (1992) but less than that discussed by Greenwald et al. (2005) on landscapes around occupied nest sites. Acreage in Alternative 6 is expected to decline to 37 percent of the total ponderosa pine acres. Alternatives 1 and 2 do not have an objective for structural stages 4B and 4C and Alternative 4 does not have an objective for structural stage 4B. The amount of these structural stages that would be available on the landscape in the future is less certain. Certainly, there would be some of each of structural stage present, but how much is unclear. Alternative 4 includes direction to maintain conditions of all existing late-successional and dense mature forest stands (Structural Stages 4C and 5), which is similar to the recommendation in Greenwald et al. (2005) to protect existing mature and old forest characteristics.

Moderately dense pine habitat is expected to be well distributed in all alternatives. Alternatives 1, 2, and 4 may focus habitat in existing late-successional and dense mature forests because guidance is designed around conserving existing conditions. However, other standards and guidelines that promote thermal cover (big game), habitat effectiveness (big game), and small-scale late-successional stands will promote distribution across the Forest. Alternatives 3 and 6 will likely provide better distribution of habitat because structural-stage objectives are likely to promote moderately dense pine habitat spread across five additional MAs that make up over 80 percent of the Forest.

Greenwald et al. (2005) noted that goshawks select for greater densities of trees over 15 inches in diameter. Alternative 1 does not include direction for providing large trees on the landscape. Alternatives 2 and 4 contain direction (Guideline 2306 treated as a standard) to manage for an average of one 20-inch diameter tree, or the largest size class available, per acre within the associated watershed. This is designed to provide large trees that may become large snags. Alternatives 3 contains direction in the structural-stage objectives (Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204) to maintain 15 percent of the structural-stage 4 and 5 basal area in the 15-to-19 inch diameter class and 10 percent of the structural-stage 4 and 5 basal area in the greater-than-19 inch diameter class. This is intended to provide medium and large diameter trees and snags throughout the mature and late-successional ponderosa pine type. Alternative 6 contains direction in the structural-stage objectives (Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204) that 10% of the structural stage 4 acreage will have a tree size of very large (16 inch diameter and greater). If this objective is achieved, this will result in about 100,000 acres on the forest with a tree size of “very large” (Section 3-2.1.1 Ponderosa Pine Ecosystem in the Final EIS). Very large trees will also occur in other stands, but at lower densities. Alternatives 2, 3, 4, and 6 will likely provide sufficient large trees well distributed across the Forest. Alternatives 3 and 6 offer the best prospect for maintaining large trees and snags across the Forest because of the large tree component in the structural stage objectives.

The above analysis assumes that no habitat is lost to natural disturbance events, such as fire and insects. An analysis of fire records for the period of 1970 to 2003 indicates the Forest averages 137 fires per year that burn approximately 8,275 acres. The majority of fires (97 percent) on the Forest are small (less than 10 acres). This analysis period includes the 2000-2003 fire seasons that had fire activity well above the established average levels. Recent fires have likely created abundant habitat for some goshawk prey species such as woodpeckers but also have reduced nesting and foraging habitat for goshawks, including destroying some nests. Wildfires will continue to burn in the future and have a cumulative effect along with planned management

actions. Calculating the number of acres burned by wildfire in the future is difficult primarily due to annual variation in ignition sources and the flammability of fuel, which in part is a function of climate.

Alternative 6 specifically includes an objective (10-01) to manage for a low-to-moderate fire hazard on 50-75 percent of the area within the WUI. Alternative 6 would manage the remainder of the Forest for 50 percent of the area in low-to-moderate fire hazard. In Alternative 3, Objective 10-01 manages for a low-to-moderate fire hazard on 50 percent of the area within the WUI. There are 21 known goshawk nests within the WUI as defined as the area around at-risk communities (ARCs). In Alternative 6 the WUI also includes NFS lands around private property, which contains another three known nests. In all alternatives, direction for identified nest areas (Standard 3108) will apply to these nests, except in Alternative 6, in which the nesting habitat would be located at least 300 feet from buildings. The typical size of a goshawk territory is such that a diversity of foraging habitat can be provided in other parts of the territory in Alternatives 3 and 6.

Alternative 6 provides the most potential reduction in acres severely burned in the future, followed by Alternative 3, Alternative 1, and Alternative 2. Alternative 4 provides the least potential reduction in acres severely burned. For more information on fire, see Section 3-7 Natural Disturbance Processes in Chapter 3 of the Final EIS.

Nest area management in all alternatives is similar to those recommended by Reynolds et al. (1992). All alternatives manage for 180 acres around known active and historically active nests in conditions that maintain or enhance the stands value for goshawks. This approach focuses some of the nesting habitat mentioned above near known nests and provides opportunities for alternate nests.

Post-fledging family area direction in Alternatives 2 and 4 (Guideline 3114) is consistent with Reynolds et al. (1992), and includes the desired balance of structural stages. Post-fledging family area direction in Alternative 1 (Guidelines 3113 and 3114) does not define post-fledging family areas and the desired conditions are not as specific as Alternatives 2 and 4. This could lead to confusion and inconsistent application during implementation. It is uncertain whether Alternative 1 would result in post-fledging family area conditions similar to those recommended by Reynolds et al. (1992). Alternatives 3 and 6 lack direction for post-fledging family areas. In Alternatives 3 and 6, conditions in post-fledging family areas would be dependant on meeting the Forest-wide structural stage objectives. Though the Forest-wide structural stage objectives provide nesting and foraging habitat across the Forest, whether every post-fledging family area would meet the conditions recommended by Reynolds et al. (1992) is uncertain.

All alternatives seek to minimize noise and disturbance near goshawk nests. Alternatives 3, 4 and 6 offer the largest disturbance distance (half-mile) and is consistent with US Fish and Wildlife Service guidelines (US Fish and Wildlife Service 1999a). Alternative 6 has the shortest timeframe for minimizing disturbance, but is consistent with Wyoming raptor survey dates and protection dates. Even with this direction, there still may be some activities such as recreational activity or other uses that could disturb individual goshawks during the nesting period

Alternatives 2, 3, 4, and 6 will likely provide adequate snags for goshawk prey species because they manage for snag densities similar to those suggested by Reynolds et al. (1992) and consistent with current snag inventories and recent snag studies (See the Forested Ecosystem Section). Alternative 1 presents a higher risk to goshawk prey species because it manages for snag densities below those suggested by Reynolds et al. (1992) and below current snag inventories and recent snag studies. In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

All alternatives will provide sufficient downed logs. All alternatives strive for 50 linear feet of downed logs (at least 10 inches diameter) in ponderosa pine forested areas. Although the number of logs is not described, the overall length is greater than amounts suggested by Reynolds et al. (1992) and Nicholoff (2003).

Alternative 1 allows habitat capability to decline by 10 percent for a given project (Guideline 3201), which may lead to a continuous decline in habitat capability over the long-term. Guideline 3201 is not included in all other alternatives.

In Alternative 1, post-fledging family areas are not defined and Guideline 3110 does not prohibit activities which would reduce the compositional and structural integrity of active and alternate nest stands. There could be a loss of habitat capability on the southern third of the Forest (USDA Forest Service 1996a). Still, this alone is not likely to cause the species to not persist on the Forest. They would likely persist at lower densities. Post-fledging family areas are easily defined using Reynolds et al. (1992) and applied to Guideline 3114. If new scientific information becomes available that highlights a different definition, that definition can be used also. Guideline 3110 does not prohibit activities, but certainly discourages activities within goshawk nest stands. The loss of habitat capability in the Revised Plan FEIS (USDA Forest Service 1996) was based on the HABCAP model. The analysis in the Phase II Amendment focused on the individual habitat features of goshawks and did not use HABCAP as an analysis tool. These features of Alternative 1 present an increased risk to goshawks, and a higher level of uncertainty as to whether the species will persist on the Forest.

The degree to which interspecific competition influences goshawk populations is unknown. Other raptors, such as red-tailed hawks and great horned owls, may exclude goshawks from nest areas (Kennedy 2003). They may also compete with goshawks for prey since there is some dietary overlap (Kennedy 2003). Fragmentation of forested habitats may make areas more suitable for other raptors and increase competition (Kennedy 2003), but the relationship and threshold are unclear. It is unclear whether the alternatives analyzed here will influence interspecific competition.

### 4-6.10.4 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Management in the national and state parks adjacent to the Forest could affect the goshawk through changes in forest structure. Wind Cave National Park, Jewel Cave National Monument, and Mount Rushmore provide a more protective management approach, which would likely contribute to goshawk conservation. Custer State Park also manages vegetation and could affect goshawks, but the extent of management is not foreseeable.

Privately owned land within the Forest boundary may also provide nesting habitat. Resource management by private citizens and companies depends on a number of factors (e.g., desired goals, market prices, development potential, etc.) making it difficult to predict future trends. Private landowners may harvest timber or treat forested lands to reduce fire hazards, which could reduce goshawk habitat. It is assumed that urban development will continue on private lands. This will likely increase the need to provide defensible space for fires around structures and could reduce goshawk nest and foraging habitat. This will likely increase the importance of habitat located on NFS lands.

Private citizens sometimes seek goshawks for falconry. This use is managed by the state game and fish agencies and has been light in the Black Hills and is not expected to cause a serious threat to the population. There has been some evidence of vandalism to one nest on the Forest, but vandalism has not been a problem Forest-wide.

It is foreseeable that more communities could be designated as ARC with fuel-reduction activities potentially occurring around them. It is uncertain how this will result in changes in placement of or levels of treatments around goshawk nests and how effects would be expected to change.

Cumulative effects are expected to be lowest under Alternatives 3 and 6 due to nest area management direction, late successional areas, sufficient snags and downed logs, and structural stage objectives. Through the structural stage objectives, a variety of structural stages, including those used for nesting, are more likely to be well dispersed across the landscape. If areas are lost to fires or insects, some of the desired habitat conditions can shift around the landscape to compensate for the loss. However, because these alternatives do not include direction for post-fledging family areas (Reynolds et al. 1992), it is uncertain whether every post-fledging family area would meet the conditions recommended by Reynolds et al. (1992).

Cumulative effects are expected to be moderate under Alternatives 2 and 4 due to nest area management direction, post-fledging family area direction, late successional areas, and sufficient snags and downed logs. A positive feature in these alternatives is the direction for post-fledging family areas. However, an ecosystem strategy built upon reserve (late successional) areas alone such as Alternatives 2, and 4 may not be as desirable in a fire influenced ecosystem such as occurs in the Black Hills because if the areas burn it will take many years to return to conditions

suitable for goshawk nesting. Also, the amounts of structural stages other than 4C and 5 that will be available on the Forest in the future are uncertain.

Cumularive effects are expected to be highest under Alternative 1. The amount and of habitat available on the landscape in the future is uncertain because Guideline 3201 allows for a continuous decline in habitat capability, the snag-density objective is low, and there is no objective, standard, or guideline in the ecosystem approach that conserves structural stage 4B and 4C stands. Also, it is uncertain whether late successional areas will be distributed so they are useful to goshawks, given their territoriality.

### 4-6.10.5 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Goshawks are likely to persist on the Forest over the next 50 years under all Alternatives. Activities that change vegetation, including wildfire, can affect goshawks. Thus, individuals may be affected under all alternatives.

Goshawks will likely persist on the Forest under Alternative 1, largely due to nest area management direction and late successional areas on the Forest. However, this alternative carries more risk than the other alternatives. The amount and of habitat available on the landscape in the future is uncertain because Guideline 3201 allows for a continuous decline in habitat capability, the snag-density objective is low, and there is no objective, standard, or guideline in the ecosystem approach that conserves structural stage 4B and 4C stands. Also, it is uncertain whether late successional areas will be distributed so they are useful to goshawks, given their territoriality.

Goshawks are likely to persist under Alternatives 2 and 4 due to nest area management direction, post-fledging family area direction, late successional areas, and sufficient snags and downed logs. A positive feature in these alternatives is the direction for post-fledging family areas. However, an ecosystem strategy built upon reserve (late successional) areas alone such as Alternatives 2, and 4 may not be as desirable in a fire influenced ecosystem such as occurs in the Black Hills because if the areas burn it will take many years to return to conditions suitable for goshawk nesting. Also, the amounts of structural stages other than 4C and 5 that will be available on the Forest in the future are uncertain.

Goshawks are likely to persist under Alternative 3 and 6 due to nest area management direction, late successional areas, sufficient snags and downed logs, and structural stage objectives. Through the structural stage objectives, a variety of structural stages, including those used for nesting, are more likely to be well dispersed across the landscape. If areas are lost to fires or insects, some of the desired habitat conditions can shift around the landscape to compensate for the loss. However, because these alternatives do not include direction for post-fledging family areas (Reynolds et al. 1992), it is uncertain whether every post-fledging family area would meet the conditions recommended by Reynolds et al. (1992).

The above determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the Structural stage and late successional objectives for each alternative. The time required to reach these objectives is dependent on funding and forest growth rates, which are not included in this analysis. As a result, it may take two or more decades to achieve these objectives.

## 4-6.11. Northern Harrier

The northern harrier is found throughout North America in a variety of open habitats. Its breeding range is from northern Alaska to Baja California east to North Carolina and southern Quebec. Although the breeding range is large, it is discontinuous (USDA-Forest Service 2003e). Winter range overlaps with breeding range in much of the northern United States and extends south to Columbia, Venezuela, and Barbados (Ehrlich et al. 1988; USDA-Forest Service 2003e).

Harriers are open-country hawks that are commonly found in prairies, wetlands, marshes, meadows, croplands, and shrublands (USDA-Forest Service 2003e). Associated topography is generally flat. Most nest sites are in undisturbed wetlands or grasslands dominated by thick vegetation (Dechant et al. 1998). The harrier is a broadly adapted hawk and can diversify its diet according to time and place (Johnsgard 1990). However, it is specialized for capturing prey while flying low over the ground (Johnsgard 1990). Its diet includes small-to-medium sized mammals (particularly voles), birds, snakes, frogs, insects, and carrion (Ehrlich et al. 1988).

The northern harrier is an uncommon migrant and summer resident in South Dakota (Tallman et al. 2002). Harriers are not currently or historically known to breed or winter in the Black Hills (Tallman et al. 2002, Luce et al. 1999). However, the species is occasionally observed here. Since 2001, harriers have been noted three times: twice in new large burns (Jasper and Red Point Burns) and once in Reynolds Prairie (USDA-Forest Service 2004b). Large open areas like these are limited on the Forest, which probably constitute the most limiting factor for harriers. Currently, there are approximately 110,000 acres of grasslands on the Forest (see Grassland/Shrubland Ecosystems section), but much of this occurs in linear meadows or isolated patches that are likely too small to support birds for a full season or more. The most extensive grasslands occur in the southern Black Hills, particularly around the Elk Mountains.

Harriers have not yet been documented in shrublands of the Black Hills, but presumably they could use at least some of this cover type. Shrublands occur on over 5,000 acres of the Forest, mostly along the Wyoming-South Dakota boundary east of Newcastle.

### 4-6.11.1 Direct and Indirect Effects

The most limiting factor for northern harriers in the Black Hills is the availability of large open areas. Large burns, interior grasslands, prairie grasslands, and shrublands all have potential to support the species. With the exception of large burns, the Forest intends to maintain, increase, or improve the area within each of these cover types, as is evidenced under several objectives across the alternatives (i.e., Objectives 202, 205 and 200-02). It is unlikely that full achievement of these objectives (e.g., restoring 12,000 acres of grassland) under any alternative would

promote breeding on the Forest because treatments would likely be scattered, and the Forest would retain its inherent forested character.

There could be a slight increase in foraging habitat for migrating or transient harriers in a given area, but it would not be to the extent that would enhance survival or promote reproduction. Effects from grazing direction (i.e., Objective 302, Standards 2501, and 2505) would follow this same logic except effects would be slightly negative instead of positive. Regardless, changes would not be of the magnitude to influence reproduction or survival. This is mainly because range condition objectives (Objective 302) and allowable use criteria (Guideline/Standard 2505) would discourage overgrazing from occurring.

In the event that northern harriers begin breeding in the Black Hills, Standard 3100-01 and/or Guideline 3204 would be enacted, depending on Alternative. Standard 3100-01 would prohibit many activities from occurring within one-half mile of any active harrier nest from March 1 through July 31. Protective dates and distances in Standards 3100-01 (Alternatives 3 and 4) are based on US Fish and Wildlife Service (1999a) Guidelines and Wyoming dates for raptor protection. This standard would apply under Alternatives 3 and 4 but not Alternatives 1, 2 or 6. Activities specifically prohibited include construction (e.g., of roads, facilities, etc.), reclamation, gravel mining, drilling (for oil, gas, or water), timber-and-fuel treatments, precommercial thinning, and blasting. Implementation of this standard would ensure minimal disturbance during the critical nesting period. In Alternatives 1, 2 and 6, Guideline 3204 encourages general protection at active raptor nests. Guideline 3204 would become a standard in Alternatives 2 and 6 and directs projects to consider recommendations from other federal and state agencies when designing management near known raptor nests. Currently, the best information on raptor protective dates comes from US Fish and Wildlife Service (1999a) Guidelines and Wyoming dates for raptor protection. Therefore, the effects in alternatives 2 and 6 are likely to be similar to Alternatives 3 and 4.

### 4-6.11.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Wind cave National Park and Custer State Park likely include suitable habitat for northern harriers. Bison graze in both parks. Privately owned lands within the Forest boundary also provide potential habitat. Resource management by companies and private citizens depends on a number of factors (e.g., desired goals, market prices, development potential, etc.) making it difficult to predict future trends. As a general rule, potential northern harrier habitat on private lands occurs in the Black Hills. Continued urban development in the Black Hills will likely continue to affect habitat, including grasslands, thereby increasing the importance of habitat on NFS lands.

There would be no cumulative effect to the northern harrier given the absence of direct or indirect effects.

### 4-6.11.3 Determination and Rationale

**No impact.** No actions would be taken on the Forest under any alternative that would appreciably affect the survival or reproduction of the northern harrier. To date, northern harriers have never been known to breed or winter on the Forest. Sufficient quality and quantity of habitat would be available for migrating or transient harriers under all alternatives.

## 4-6.12. Peregrine Falcon

The peregrine falcon has a worldwide distribution, and breeds on every continent but Antarctica (Terres 1991). In the United States, it occurs over much of the West and the eastern shoreboard. However, because peregrines have very large territories, population densities are low throughout its range (Johnsgard 1990).

The U.S. Fish and Wildlife Service listed the peregrine as endangered in 1970 in response to a substantial decline in reproduction. In 1973, the pesticide DDT was banned in the US in effort to promote recovery. The species was delisted in 1999 after recovery objectives were met. The peregrine is currently listed as a sensitive species since policy dictates this status for at least five years after delisting (Forest Service Manual Region 2 Supplement 2672.11).

The peregrine falcon inhabits a wide variety of open habitats if cliffs are present (Terres 1991). Optimal cliffs are generally at least 200-to-300 feet high and dominate the surrounding landscape (Sharps and O'Brien 1985). Nest sites are typically on open ledges or shelves that are protected by cliff overhangs and tend to be on higher cliffs (Johnsgard 1990). Nest sites are generally considered the most limiting factor for the species and have a large influence on where the species occurs.

In the Black Hills, the peregrine falcon is an uncommon spring and rare fall migrant and a rare winter visitor (Tallman et al. 2002). Potential nest sites may occur in deep rocky canyons or other places with tall vertical cliffs (US Fish and Wildlife Service 1984). Historical records indicate nesting occurred in the Black Hills in the 1960s (US Fish and Wildlife Service 1984). The peregrine has not been documented breeding in the Black Hills since that time despite efforts to re-establish it through cross-fostering and hacking during the late 1970s and late 1990s (USDA Forest Service 1979, Sharps and O'Brien 1985, Tallman et al. 2002). Evaluation of potential peregrine habitat by the Peregrine Fund concluded that most of the Black Hills does not provide adequate nesting sites. The Monitoring Birds of the Black Hills program has not detected peregrines anywhere in the Black Hills since it began in 2001 (Panjabi 2001, Panjabi 2003, Panjabi 2004). The nearest known nesting population is in the Bighorn Mountains of Wyoming, and it established relatively recently.

Peregrines prefer to hunt in relatively open areas where they can maneuver to capture small and medium sized birds (Terres 1991). Peregrines are adept aerial hunters and are known to kill a diverse array of prey. Potential prey species in the Black Hills include jays, doves, swifts, swallows, and many other species. Peregrines have very large home ranges and may travel up to 17 miles from nest sites to search for prey (US Fish and Wildlife Service 1984). Open areas that could provide foraging habitat in the Black Hills include grasslands, shrublands, and structural stages with open canopies (1, 2, 3A, 4A). Currently, there are nearly 600,000 acres that meet these criteria on the Forest.

The main factors that may limit occupation of the Black Hills by peregrines are the lack of tall unbroken cliffs and isolation from established breeding populations.

### 4-6.12.1 Direct and Indirect Effects

The peregrine falcon does not currently breed in the Black Hills and is considered uncommon even during migration. Because of this, most Forest activities would have no effects. Potential nest sites would be difficult to alter due to the stability and inaccessibility of rock cliffs. Potential foraging habitat could be increased or decreased in size, but considering the current preponderance of unutilized habitat, it is unlikely such changes would affect future use by peregrines. Peregrines feed on a large variety of birds, and changes in vegetation within open habitats are relatively unimportant. This is evidenced by the wide range of habitats in which the peregrine occurs, some of which have much sparser bird life than what is characteristic of the Black Hills (e.g., tundra, desert, and high mountains).

In the event that peregrines did begin nesting in the Black Hills, Standard 3100-01 and/or Guideline 3204 would be enacted, depending on alternative. Standard 3100-01 would prohibit many activities from occurring within one-half mile of any active peregrine nest from March 15 through August 15. Protective dates and distances in Standards 3100-01 (Alternatives 3 and 4) are based on US Fish and Wildlife Service (1999a) Guidelines and Wyoming dates for raptor protection. This standard would apply under Alternatives 3 and 4, but not Alternatives 1, 2 or 6. Activities specifically prohibited include construction (e.g., of roads, facilities, etc.), reclamation, gravel mining, drilling (for oil, gas, or water), timber and fuel treatments, precommercial thinning, and blasting. Implementation of this standard would ensure minimal disturbance during the critical nesting period. In Alternatives 1, 2 and 6, Guideline 3204 encourages general protection at active raptor nests. Guideline 3204 would become a standard in Alternatives 2 and 6 and directs projects to consider recommendations from other federal and state agencies when designing management near known raptor nests. Currently, the best information on raptor protective dates comes from US Fish and Wildlife Service (1999a) Guidelines and Wyoming dates for raptor protection. Therefore, the effects in alternatives 2 and 6 are likely to be similar to Alternatives 3 and 4.

In summary, none of the alternatives would affect foraging habitat to the extent that it would affect suitability to peregrines. All of the alternatives would afford protection to nest sites, but protection would be most assured under Alternatives 2, 3, 4, and 6.

### 4-6.12.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

The peregrine falcon is not known (currently or historically) to occur anywhere in or adjacent to the Black Hills at higher frequency than it occurs on the Forest. There are fewer potentially suitable nest cliffs available off the Forest than on the Forest. There would be no cumulative effect to the peregrine falcons given the absence of direct or indirect effects.

### 4-6.12.3 Determination and Rationale

**No Impact.** Peregrine falcons currently do not occur in the Black Hills, and few breeding birds were historically supported here. Nesting habitat is very limited but stable. Forest activities would not affect nesting habitat. Foraging habitat is widely available and does not appear to be the limiting factor. Forest management could affect foraging habitat but not to the degree that it would affect suitability to peregrines.

## 4-6.13. Yellow-Billed Cuckoo

Yellow-billed cuckoos occur in riparian and other deciduous woodlands throughout the United States, except in the Northwest and northern Rocky Mountains (USDA-Forest Service 2001d). Although they are found throughout most of the West, cuckoos are not common there (USDA-Forest Service 1981). In western South Dakota and eastern Wyoming, the species is a rare to uncommon summer resident (Nicholoff 2003, Tallman et al. 2002, USDA-Forest Service 2001d). During winter, the cuckoo resides in South America (Ehrlich et al. 1988).

The yellow-billed cuckoo is considered a riparian obligate species (Nicholoff 2003). Breeding habitats must be at least 25 acres in size, but habitats greater than 100 acres and 330 feet wide are preferred (Nicholoff 2003). Canopy cover often exceeds 50 percent in both the understory and overstory (Nicholoff 2003). Dense undergrowth or thickets are typically present (Ehrlich et al. 1988, Nicholoff 2003). Nests are often found in shrubs (e.g., mature willows) four-to-eight feet off the ground (Ehrlich et al. 1988; NatureServe 2004b).

Breeding habitat in the Black Hills occurs mainly in low-elevation riparian areas. Most of these riparian areas occur on private lands that are outside of (below) the Forest boundary (Marriot and Faber-Langendoen 2000b, Panjabi 2003). Habitat is very limited on the Forest and has most potential to occur where narrowleaf cottonwood or bur oak riparian corridors meet the Forest boundary at the edge of the Black Hills. See Low-elevation Riparian Ecosystems section for a further description of these habitat types.

Breeding has been documented at one location on the Forest and is suspected at a second (Wyoming Natural Diversity Database 2003, Panjabi 2003). Both areas are at relatively low elevations (<5,400') in or near the Bearlodge Mountains in Crook County, Wyoming.

The verified breeding location is an isolated Forest Service parcel east of the main Bearlodge unit surrounded entirely by private lands. Breeding has not been documented there since 1988, but the site has not been monitored recently (Wyoming Natural Diversity Database 2003). This area is within MA 5.4 (Big Game Winter Range). Vegetation characteristics at the site have not been described.

The unconfirmed breeding location was discovered in 2002 (Panjabi 2003) and occurs on NFS land in the main body of the Bearlodge Ranger District. At least three yellow-billed cuckoos were recorded there, and while no nests were observed, the habitat, date, and number of individuals witnessed indicate the site was likely used for breeding. The site was a mature bur-oak woodland that had a well-defined understory and very large diameter trees. It falls within MA 4.1 (Limited Motorized Use and Forest Product Emphasis).

A major portion of the cuckoo's diet consists of caterpillars, and breeding often coincides with outbreaks of tent caterpillars and other insects (Ehrlich et al. 1988; USDA-Forest Service 2001d). Spiders, frogs, lizards, and fruits are also consumed (Nicholoff 2003).

Yellow-billed cuckoos are extremely sensitive to habitat alterations (Nicholoff 2003). Population declines have been partially attributed to deterioration and fragmentation of riparian woodland habitat, and to prey scarcity caused by pesticides (Nicholoff 2003). Degradation of riparian habitats has occurred in the Black Hills since settlement by Euro-Americans, particularly before enactment of environmentally protective laws (e.g., Clean Water Act). Major causes of degradation have included grazing, placer mining, cultivation, road development, dam construction, channel realignments, urbanization, and loss of beaver influence (Parrish et al. 1996).

### 4-6.13.1 Direct and Indirect Effects

Very little low-elevation riparian woodlands occur on the Forest; therefore, most Forest-management actions would have little or no effect on the yellow-billed cuckoo. However, activities within or near low-elevation riparian areas could have effects. The activities include riparian and bur oak restoration efforts, livestock grazing, ground disturbing activities, and insect control efforts.

All alternatives have measures to minimize impacts and promote sustainability to riparian habitats in general. Objective 104b (all alternatives) seeks to provide stable streams, diverse riparian vegetation, and effective ground cover with the intent to control runoff and erosion. Objective 105 limits motorized vehicle use in riparian areas to specific locations and times of year. These would help prevent further fragmentation and degradation of riparian habitats.

Guideline 9107 (Alternatives 1, 2, and 4) and Standard 9107 (Alternatives 3 and 6) help implement these two objectives (104b and 105) by prohibiting vehicles from entering perennial streams where resource damage would occur (except specific points). Guideline 3106 (Alternatives 1, 2, and 4) would discourage trail or road construction activities in riparian areas occupied by sensitive plants. Under Alternatives 3 and 6, this would be converted to a standard (Standard 3106), and the language is broadened to include any ground disturbing activities and all sensitive species (not just plants). The standard specifically prohibits the removal of riparian vegetation as well as filling, dredging, or diverting streams where sensitive species occur. These prohibitions would help properly manage known cuckoo sites but would not protect potential habitat.

Livestock grazing could affect the yellow-billed cuckoo if it reduced the density or complexity of understory riparian vegetation. Research in the Black Hills has shown that cattle eat bur oak throughout the grazing season (Uresk and Painter 1985). Because regenerating and young oak are most accessible to cattle, grazing could reduce the understory component.

All alternatives would continue to allow livestock in fenced riparian areas. In Alternatives 1, 2, and 4, this would be encouraged as a guideline (Guideline 2507); in Alternatives 3 and 6 it would be enforced as a standard (Standard 2507). In Alternatives 1, 2, and 4, the guideline sets herbaceous utilization limits but is silent to utilization on woody plants (see Guideline 2505

discussed below). In Alternatives 3 and 6, the standard does not discuss utilization limits but instead specifies that riparian grazing can occur as long as it meets the objectives of maintaining, enhancing, or conserving reiparian ecosystems and emphasis species persistence. Presumably, this direction would be employed to protect cuckoo habitat if grazing was inhibiting regeneration or shrub growth, especially if Alternative 3 or 6 were selected. The same assumption is made regarding implementation of Guideline 2505 (Alternatives 1, 2, and 4) or Standard 2505 (Alternatives 3 and 6), which allow up to 40 percent utilization on woody riparian plants. Guideline/Standard 2505 would accommodate lower use levels if site-specific objectives identified a need. Therefore, if 40 percent utilization appeared too high to allow bur-oak regeneration or otherwise inhibited cuckoo habitat, the grazing system could be changed.

The yellow-billed cuckoo may also be affected by management actions taken to control insect outbreaks, particularly their primary food source, the tent caterpillar. The forest tent caterpillar (*Malacosoma disstria*) is known to occur on the Forest (USDA-Forest Service 1996 p. 3-228) but is not considered a pest, and its populations are not routinely monitored. Conversely, outbreaks of the non-native gypsy moth (*Lyrnantria dispar*) off the Forest are being documented (USDA-Forest Service 2004a p. 71). The gypsy moth has not been documented on the Forest, but it is being found at private campsites near the Forest (USDA-Forest Service 2004a p. 71). If pesticide treatments for gypsy moths ever become necessary, other species of caterpillar, such as the forest tent caterpillar, may be inadvertently killed, potentially affecting the prey base of the yellow-billed cuckoo.

Positive efforts to restore riparian communities can be found in several areas. Bur-oak management direction is perhaps the most notable example, especially if it was applied in low-elevation riparian sites. Objective 203 (all alternatives) encourages the Forest to manage 30-to-50 percent of each bur-oak stand to have trees older than 100 years. This would ensure that all stands had a mature component, which is an important habitat feature for yellow-billed cuckoos. If the objective was fully attained in low-elevation riparian sites, it would help assure an adequate distribution of yellow-billed cuckoo habitat on suitable sites.

Objective 203 implies that 50-to-70 percent of each stand would have younger replacement oak for future maturation. Regeneration is not specifically included or excluded from this objective, but it is a very important component for ensuring long-term sustainability of any plant community. Sieg (1991) suggests that regeneration can be problematic in bur-oak stands. Objective 201 complements Objective 203 by guiding the Forest to restore 4,000 acres of bur-oak forest in Alternatives 3 and 6; presumably these efforts would target regeneration if it were identified as problem. Alternatives 3 and 6 are not specific about where oak restoration efforts would occur, except that Alternative 6 calls for bur oak restoration to be directed away from the Bear Lodge Mountains where it is plentiful. Because bur-oak riparian forests often occur near the Forest boundary, they partially coincide with WUIs. Whether or not these areas would be included in the 4,000-acre objective is unknown, but it is worth noting that dual objectives (cuckoos and WUIs) could be accomplished with proper project placement. Bur oak and other hardwoods have relatively low fire-hazard ratings, so this would not conflict with fire hazard objectives.

Other restoration efforts that could benefit cuckoos stem from Objectives 214 and 215. Objective 214 would aim to restore 500 acres (Alternatives 1, 2, 4 and 6) or 1,000 acres (Alternative 3) of

riparian-shrub communities (e.g., willows). Objective 215 would target restoration in three stream reaches in Alternatives 1, 2, and 4 and five reaches in Alternatives 3 and 6. While there are no assurances these efforts would occur in locations with potential to benefit the cuckoo, the opportunities are there.

The increases in the extent and quality of riparian areas under Alternatives 3 and 6 would likely show only limited improvement over Alternatives 1, 2, and 4 simply due to the lack of low-elevation riparian habitat that occurs on the Forest.

### 4-6.13.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Federal, state, and private lands adjacent to the Forest are assumed to contain low-elevation riparian forest habitat. However, the extent and suitability of this habitat for the yellow-billed cuckoo is unknown. Due to historic and present land use practices occurring on private lands containing low-elevation riparian forest, potentially suitable habitat for the yellow-billed cuckoo in the Black Hills and surrounding landscape is likely severely limited.

Management actions under the Phase II Amendment alternatives on the Forest are not expected to contribute to the cumulative adverse impact to the yellow-billed cuckoo or its habitat. Alternatives 3 and 6 may have a slight beneficial impact if areas containing low-elevation riparian forest on the Forest are targeted for restoration and managed for the specific habitat requirements of the yellow-billed cuckoo.

The most cumulative benefits are expected under Alternatives 3 and 6 due to objectives to restore riparian areas and stream reaches. The increases in the extent and quality of riparian areas under Alternatives 3 and 6 would likely show only limited improvement over Alternatives 1, 2, and 4 simply due to the lack of low-elevation riparian habitat that occurs on the Forest.

### 4-6.13.3 Determination and Rationale

**May adversely impact individuals but is not likely to cause a trend to federal listing or loss of viability in the planning area.** A small amount of low-elevation riparian areas occur on the Forest and could provide habitat for yellow-billed cuckoos. All alternatives provide measures to conserve or enhance riparian areas; however, Alternatives 3 and 6 generally promote more restorative efforts that could benefit the cuckoo. Riparian grazing would occur in any alternative, but Alternatives 3 and 6 would emphasize sensitive-species needs over livestock needs. Utilization levels could be altered to accommodate the needs of the yellow-billed cuckoo. Alternatives 3 and 6 would likely be more beneficial than the other alternatives due to the increased levels of riparian-and-stream restoration, additional emphasis placed on monitoring, and enhanced levels of livestock management near emphasis species habitat.

# 4-7. SPECIES DESCRIPTIONS AND EFFECTS ANALYSIS - MAMMALS

This section contains the distribution and status, natural history, direct and indirect effects, cumulative effects, resource conservation measures, and determination and rationale for Region 2 sensitive mammals.

The indirect and cumulative effects analysis for species persistence is bounded in time as the next 50 years. This temporal scale is based on: a) the planning horizon (usually 50 years for a Forest plan); b) the biology of the species (e.g., generation time, response time to changed conditions, recolonization capability); and c) the time needed for the overall ecosystem to respond to proposed management (Liggett et al. 2003).

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). This area was chosen because it encompasses similar ecosystem components and species that occur on the Black Hills National Forest. A larger area would include the surrounding plains, which includes a vastly different suite of species and ecosystem components.

## 4-7.1. American Marten

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) gives an overview of distribution and life history for the American marten and is incorporated here by reference.

The American marten is distributed over much of the western United States where it occurs in moist boreal forests (Buskirk 2002). The South Dakota Game, Fish, and Parks (SDGFP) reintroduced a total of 125 individuals into the Black Hills during the 1980s and 1990s (Buskirk 2002). Fecske et al. (2003) recently estimated that 124 resident martens occur in high quality habitat, with additional animals occurring at lower density within lower quality habitat. Although considerable mortality and reproduction have likely occurred here since reestablishment began, it appears the marten population trend is relatively stable in the Black Hills (USDA-Forest Service 2004a).

According to a recent marten study (Fecske et al. 2003), the greatest marten concentrations appear to be in the northern part of the Forest southwest of Deadwood (northern subpopulation) and in and around the Norbeck Wildlife Preserve (Norbeck subpopulation) (Fecske et al. 2003). These two dominant subpopulations are likely very important in maintaining species persistence in the Black Hills. The Black Hills supports an isolated population, with the nearest neighboring population in the Bighorn Mountains of Wyoming (Buskirk 2002).

The main threats to American martens are habitat fragmentation and timber harvest (Buskirk 2002). Small isolated populations, such as are found in the Black Hills, are vulnerable to extinction from lack of genetic variation, disease, and catastrophic events (e.g., stand-replacing fires) (Buskirk 2002).

The American marten is listed as protected in South Dakota. In Wyoming, it is classified as a furbearer. American marten may be legally trapped in the Wyoming portion of the Black Hills.

Martens are primarily associated with mature white spruce in the Black Hills. Key habitat elements are relatively dense forests with complex physical structure near the ground, abundant coarse woody debris, and lengthy fire-return intervals (Buskirk 2002). Martens prefer moist coniferous forest types with tree species that have branches on their lower boles. White spruce is the only tree species on the Forest that provides this condition (USDA-Forest Service 1996). Approximately 25,000 acres of white-spruce stands currently occur on the Forest, mostly at high elevations, on north aspects, and in cool canyon bottoms. Fire suppression during the last century has allowed spruce to increase in abundance, density, and maturity in the Black Hills, usually at the expense of quaking aspen (Parrish et al. 1996, USDA-Forest Service 1996). One estimate suggests that there may be as much as 10,000 acres more spruce today than what was here in the late 1800's (USDA-Forest Service 1996); however, some of this acreage may be explained by more accurate mapping techniques available today. Although it is difficult to quantify the increase in spruce, it is likely that more marten habitat occurs in the Black Hills today than occurred prior to European settlement. For additional or supporting information on white spruce in the Black Hills, refer to the Section 3-2.1.2 White-Spruce Ecosystems and Section 3-7 Natural Disturbance Processes in Chapter 3 of the Final EIS.

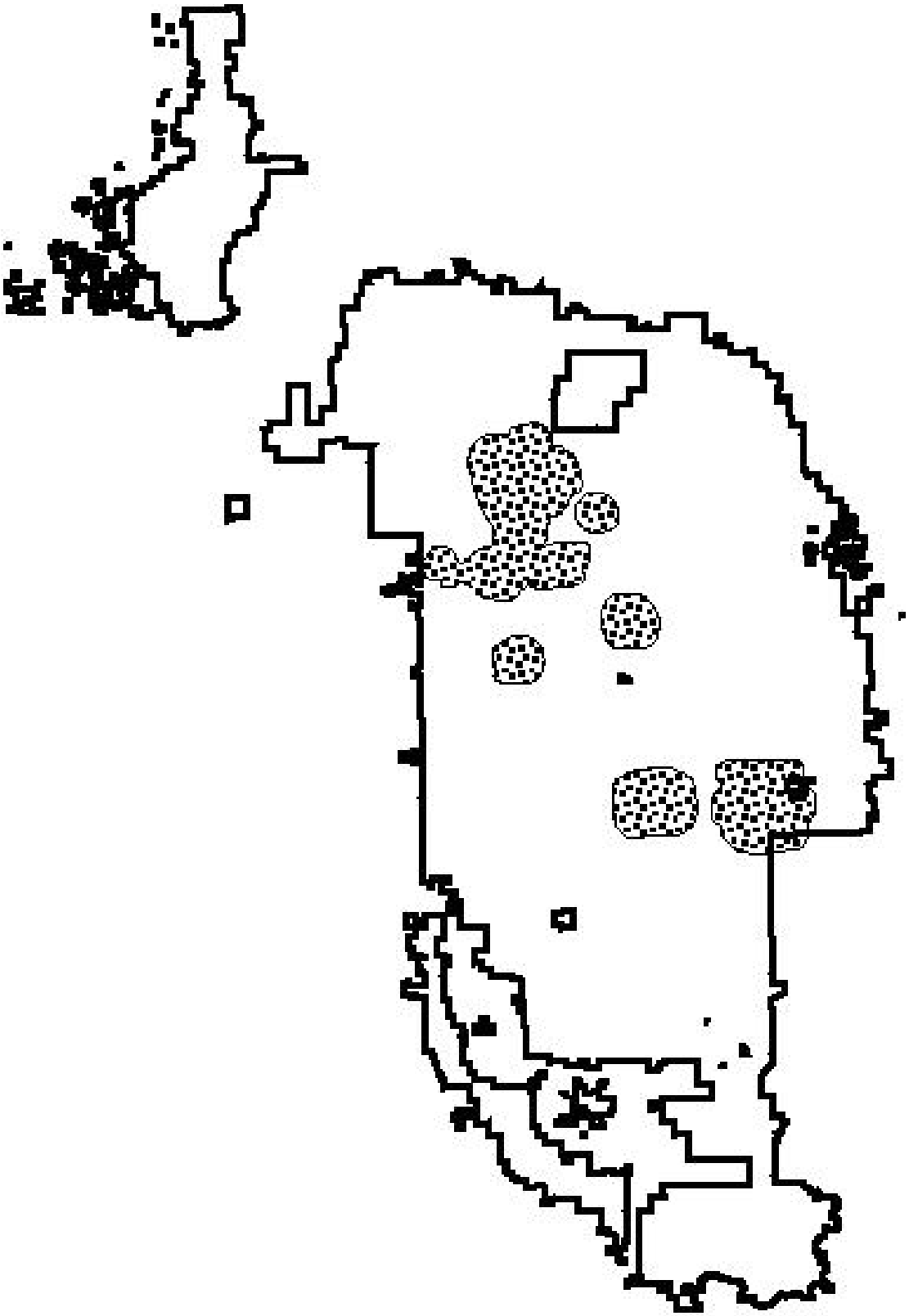
Fecske et al. (2003) quantified high quality marten habitat on the Forest based on a habitat relation model (Fecske et al. 2002). They estimated approximately 131,600 acres of high quality marten habitat exist on the Forest. About 11 percent of this is in the spruce cover type. Approximately 91,000 acres of the high quality marten habitat supports the two main subpopulation centers, of which about 14 percent is in spruce. Spruce makes up only about two percent of the forested acres Forest-wide. This supports the literature that marten appear to use spruce disproportionately to its availability in the Black Hills.

American marten typically avoid dry ponderosa-pine sites; however, due to the limited distribution of spruce in the Black Hills, most marten territories undoubtedly contain some portion of pine (Buskirk 2002). Mature and late-successional pine stands also help maintain connectivity between spruce stands. Martens are sensitive to habitat fragmentation and will not move through large, non-forested areas.

Coarse woody debris is an important component of marten habitat. Large logs and other structures provide protection from predators, access to the subnivean (i.e., beneath the snow) space where most winter prey are captured, and protective thermal conditions, especially during winter (Buskirk and Powell 1994). A variety of structures are used for dens, with trees, snags, logs, and rocks accounting for 70 percent of reported den structures (Buskirk and Ruggiero 1994).

Important prey species in the Black Hills are the southern red-backed vole (*Clethrionomys gapperi*), red squirrel (*Tamiasciurus hudsonicus*), and northern flying squirrel (*Glaucomys sabrinus*) (Buskirk 2002). Martens will also eat carrion, bird eggs, insects, and fruit (Buskirk and Ruggiero 1994). Martens breed from June to August, and after delayed implantation, give birth the following April and May to a litter of three (Buskirk 2002).

**High Quality Marten Habitat in the Black Hills as identified by Fecske et al. (2003).**



Source: Fecske et al. (2003)

### 4-7.1.1 Direct and Indirect Effects

American martens are closely associated with spruce forests in the Black Hills, and actions that modify spruce may also modify marten distribution and abundance. Although spruce is not a commercially important tree species on the Forest, spruce could be harvested or otherwise treated for two main reasons: to reduce fire-hazard ratings and to benefit hardwood and riparian communities.

Under Alternatives 1, 2, and 4, Objective 204 calls for managing and conserving white spruce as well as lodgepole pine, limber pine, and Douglas fir. Objective 200-01 was established under Alternative 3 to provide for late-successional stages within white spruce, favoring hardwood restoration where spruce has encroached upon hardwoods, and favoring spruce where it is encroaching into pine stands, especially where it improves connectivity between spruce stands. Spruce still may be treated where it occurs within 300 feet of buildings to provide for defensible space for fires. In Alternative 6, Objective 200-01 manages for 20,000 acres of spruce habitat across the Forest. In Alternative 6, spruce could be treated within 200 feet of buildings, where spruce has encroached into hardwoods, and for emphasis species management.

Alternatives 2 and 4 have specific conservation measure (Standard 3215) that directs the Forest to prevent a decrease in high quality marten habitat and connective corridors. This is likely the most influential positive guidance affecting marten in any alternative. It would ensure all high quality habitat is maintained.

Both spruce and aspen are recognized as a valuable component of diversity in the Black Hills. Therefore, several objectives are designed to obtain a balance between these critical resources. Objective 201 conserves and restores hardwoods, including aspen. Spruce may be removed in some areas to meet this objective. Under Alternatives 1, 2, and 4, the objective is to conserve or restore hardwood communities by 10 percent over 1995 conditions. For Alternatives 3 and 6, this amount is approximately doubled; 46,000 acres of aspen are targeted for restoration during the life of the planning period. Under Alternatives 3 and 6, priority areas are those where conifers, including spruce, have out-competed aspen adjacent to riparian areas that once supported beaver colonies.

Objective 10-01 strives for reduced fire hazard on the Forest. Alternative 6 specifically includes an objective (10-01) to manage for a low-to-moderate fire hazard on 50-75 percent of the area within the WUI. Alternative 6 would manage the remainder of the Forest for 50 percent of the area in low-to-moderate fire hazard. In Alternatives 3 and 4, Objective 10-01 manages for a low-to-moderate fire hazard on 50 percent of the area within the WUI. Some areas would be excluded from WUI treatments; these include the Black Elk Wilderness; the Norbeck Wildlife Preserve; the Peter Norbeck Scenic Byway; MA 3.7 (late succession); Botanical Areas; and RNAs. WUI calculations below do not include these areas.

Calculations quantifying the amount of marten habitat in relation to the WUI are provided in the table below, with analyses to follow.

**Table C-3.** Acres of High Quality Marten Habitat on NFS Lands

| Acres of High Quality Marten Habitat, Irrespective of WUI | | | |
|---|---|---|---|
| | Total Acres (All Cover Types Combined) | Total Acres of Spruce | Acres of Mature[1] Spruce |
| Subpopulation Centers | 90,700 | 13,000 | 11,900 |
| Total High Quality Habitat[2] | 131,600 | 14,600 | 13,400 |
| | | | |
| **Acres of High Quality Marten Habitat Within the WUI** | | | |
| | Total Acres in WUI (All Cover Types Combined) | Total Acres of Spruce in WUI | Acres of Mature[1] Spruce Within WUI |
| Subpopulation Centers | 11,500 | 1,500 | 1,300 |
| Total High Quality Habitat[2] | 17,300 | 1,700 | 1,500 |

[1] Structural stages 4A, 4B, 4C and 5. Note that this includes late-successional stands.
[2] Includes both subpopulation centers and other high quality habitat on the Forest (as determined by Fecske et al. 2003)

Almost all of the spruce in marten habitat and in the WUI is in mature condition (92 percent and >87 percent respectively, including late succession). Approximately one percent (1,300 acres) of mature spruce within the two subpopulation areas falls within the WUI. The same percentage of total high quality habitat occurs within the WUI although as expected the number of acres is slightly higher (1,500).

In Alternative 6, spruce habitat may decline from approximately 25,000 acres to about 20,000 acres (Objective 200-01). This is largely due to treatments to increase aspen where spruce has encroached and for emphasis species management. However, spruce habitat is expected to remain at levels similar to that which was estimated in 1995.

All mature spruce would remain standing under Alternative 3, except where it occurs within 300 feet of buildings and for hardwood restoration (Objective 200-01). It is difficult to predict how much occurs within 300 feet of buildings. However, based on the idea that the most mature spruce is on steep slopes where logging, construction, and other activities are deterred, it is not likely to be a substantial amount.

Alternative 4 would protect mature spruce in marten habitat from fire-hazard-reduction activities through Standard 3215. This standard requires that the microclimate in marten habitat be maintained. Marten habitat is defined here as structural stages 3B, 3C, 4B, 4C and 5. Structural stage 4A would not be specifically protected by this standard, but because its relatively low canopy cover is less susceptible to active crown fire, it would be considered a lower fire hazard than structural stages 4B, 4C, or 5. Therefore, it would likely be considered a lower priority to treat in fire-hazard-reduction activities than would other stands (e.g., ponderosa-pine structural stage 4B). Objective 10-01 has sufficient flexibility in it that not all mature stands would need to be treated, and it would logically be implemented such that the highest hazard fuel would be treated first.

It is unlikely that the small amount of non-mature spruce (structural stages 1, 2, 3A, 3B, 3C) would be treated for fire-hazard reduction in any alternative since there would likely be higher hazard (higher priority) ponderosa pine stands to treat. Furthermore, of these structural stages, 3C is the only one rated as having high fire hazard. Less than 35 acres of 3C spruce stands occur in either of the two marten population centers, and none of it is within the WUI. Only 15 acres more occur in other marten habitat, but only one acre of this is within the WUI. Therefore, it is not only unlikely that any 3C would be treated but also highly unlikely that there would be any measurable effect to martens if it were treated.

About 17,300 acres (13 percent) of high quality marten habitat exists within the WUI. All but 1,700 acres of it is in cover types other than spruce. This includes pine, meadows, and other cover types not necessarily preferred by marten, but that would be part of an individual animal's home range. Approximately 13,300 acres of ponderosa pine occur here. Some of this could be important connective (corridor) habitat between spruce patches. Treating these potential travelways could be detrimental to marten if canopy cover was reduced below 30 percent since marten are intolerant of these conditions (USDA-Forest Service 2000b).

Standard 3215 provides for connective corridors to mitigate fragmentation concerns in all alternatives except Alternative 1. It does so in Alternatives 3 and 6 by requiring a minimum canopy closure of 40 percent and 50 percent, respectively, where corridors are identified (inside and outside of WUI treatment areas). In Alternatives 3 and 6, the location of important connectivity corridors may not remain static over time. They may shift on the landscape depending on the occurrence of natural disturbances or changing vegetation conditions. In Alternatives 2 and 4, the standard prohibits any thinning in connective habitat and encourages the establishment of new corridors. In all alternatives where corridor habitat is recognized (Alternatives 2, 3, 4, and 6), connective corridors would be identified and protected through project-level analyses. If standards and guidelines are implemented, Alternatives 2, 3, 4 and 6 will likely provide sufficient connectivity between high quality habitat. There would be no assurance that connective habitat would be maintained in Alternative 1 since there is no specific direction to do so. It is likely that at least some corridor habitat would remain in Alternative 1 because there would always be areas on the landscape with adequate levels of canopy cover, and even if just by chance, some of this would probably occur between spruce stands. Alternative 1 offers less certainty that this habitat connectivity will be provided.

Management activities in pine stands adjacent to marten habit could also reduce the effective area of a spruce stand and increase habitat fragmentation. Martens may need to increase their home range to compensate for a reduction in pine habitat even though pine is not the preferred portion of a marten's range. All alternatives restrict the size of clearcuts in even-aged management to 40 acres and in uneven-aged management to 10 acres. This is important because marten appear to require large expanses of contiguous forest (Fecske et al. 2003), and large clearcuts could fragment habitat.

Discussions regarding the effects of fuel treatments would also apply in a general fashion to treatments that would occur under Alternatives 1 and 2. However, in those two alternatives, vegetation treatments would be less intensive, and effects would be correspondingly lighter. The effect on marten habitat would be much lower under Alternative 2 because Standard 3215

mandates the protection of marten habitat and connective corridors. Alternative 1 has no specific protection for marten and leaves more opportunity for detrimental management to occur.

Because fire-hazard reduction Objective 10-01 applies only to areas outside of the Norbeck Wildlife Preserve and the Black Elk Wilderness, few treatments would be expected to occur within the Norbeck subpopulation center. There is very close overlap between the marten population center and the designated areas (i.e., the Preserve and the Wilderness). A small amount of area outside of Norbeck but inside the Keystone ARC could affect the Norbeck subpopulation habitat if it was treated to reduce fire hazard.

Alternative 6 is unique among alternatives in that Objective 10-01 is expanded to strive for low-or-moderate fire hazard across 50 percent of the entire Forest. This would be in addition to the treatments within the WUI. Whereas WUI treatments could affect 13 percent of the high quality marten habitat, some portion of the remaining 87 percent of high quality habitat could be affected, excluding the amount of protected acreage associated with the Norbeck subpopulation. There could be treatments in mature ponderosa-pine stands with moderate-or-high canopy cover (structural stages 4B, 4C, and 5) that are not deemed connective corridors but are used by marten for other purposes (e.g., winter foraging). This direction could reduce the effective area of high quality marten habitat but to what extent cannot be fully determined until project-level analysis occurs.

Reducing fire hazard may also be a benefit to marten and their habitat. Reducing fire hazard on the landscape while providing habitat elements may reduce the chance that marten habitat will be lost to a fire. Alternative 6 provides the greatest reduction of high or very high fire hazard followed by Alternative 3, Alternative 1, and Alternative 2. Alternative 4 provides the least reduction in fire hazard rating. Fire hazard reduction does not necessarily reduce the probability that a fire will occur. However, lower hazard increases the probability of lower fire intensity (surface fire versus crown fire) and easier control or containment should a fire occur.

Riparian restoration Objectives 200-07, 214, and 215 also may affect preferred marten habitat. Objective 200-07 is designed to benefit autumn willow and hoary willow in the McIntosh Fen BA (the Fen). To maintain suitable conditions for these willows, Alternatives 3 and 6 specify removing spruce on adjacent foot-slopes, which would not result in an appreciable loss of marten habitat because the Fen is currently very open and does not provide connective or other marten habitat. Therefore, removing spruce from adjacent foot-slopes would result in a linear habitat loss that would not affect travel corridors or fragment interior forest conditions. Furthermore, the Fen is not within either of the two marten concentration centers.

Objectives 214 and 215 also address riparian restoration. Under Objective 214, Alternative 3 would restore 1,000 acres of riparian-shrub communities while Alternatives 1, 2, 4 and 6 would restore only 500 acres. Riparian-shrub restoration would likely have little effect on marten habitat because it would probably involve more structural protection (e.g., fencing) of willows than it would removal of spruce. Objective 215 targets five stream reaches for restoration in Alternatives 3 and 6; three reaches are targeted in Alternatives 1, 2, and 4. Overall, these actions are not likely to appreciably affect the amount of American marten habitat, either negatively or positively, due to the reaches' limited extent across the Forest and corresponding low likelihood of occurring in marten habitat.

Because coarse woody debris is an important component of marten habitat, several standards and guidelines address slash retention following harvest or treatment. Through Standard 2308a, Alternatives 2, 3, 4, and 6 require at least 100-linear-feet per acre of coarse woody debris that a minimum of 10 inches in diameter in conifer-forested areas. In Alternatives 2 and 4, this direction is specifically targeted in areas with a high potential for marten occupancy. High quality habitat identified by Fecske et al (2003) offers the best estimate of areas with a high potential for occupancy. Alternative 1 requires only 50 feet and is therefore less beneficial to martens. Alternatives 2 and 4 have an additional requirement (Standard 2308b) that at least 20 of the 100 feet must have a minimum diameter of 20 inches, which makes these alternatives superior to all other alternatives when considering coarse woody debris. The larger diameter woody debris provided in Alternatives 2 and 4 would allow for the best dens, resting sites, and prey habitat.

Standard 3117 requires that any harvest adjacent to marten habitat (i.e., spruce stands) must maintain at least one pile of woody material per two acres in Alternatives 2 and 4. In Alternatives 3 and 6 this Standard applies across the Forest, not just near marten habitat. These piles create habitat structure for the small mammals preyed upon by the marten. This standard is a component of all alternatives except Alternative 1. Under Alternative 6, slash piles would not be required within 300 feet of buildings. This is a minor difference that would make no difference to the quality of marten habitat when compared to the other alternatives.

In summary, Alternative 2 would provide the most optimal management direction for marten because Standard 3215 specifically protects marten habitat and connective corridors. Alternative 6 would have the largest negative impact to the marten and its habitat as the fire-hazard objective (10-01) would result in more of the Forest being in open conditions less preferred or avoided by marten. Hardwood and riparian restoration objectives in all alternatives could have some impact to marten, but the amount and location of spruce treated to meet these objectives would probably have fewer consequences than the fire-hazard treatments.

### 4-7.1.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

The Black Hills provides the only marten habitat for nearly 200 miles. The USDA-Forest Service administers almost the entire high quality marten habitat here. Some of the Norbeck subpopulation area may lie within Custer State Park (the Park), but most of this is protected due to the Park's mission and because spruce is not a valuable commodity. Although there is a significant amount of privately owned lands in the Black Hills, most occurs in pine forest or in meadows. Where private lands do include high quality habitat, it could be subject to low-density development (e.g., rural residences). These private lands would in fact be the basis for the WUI. It stands to reason that many landowners have been or could be conducting fuel-reduction activities to protect their homes and viewshed. Furthermore, they would not likely apply any

mitigation to minimize effects to martens (e.g., maintaining connective corridors). Due to the combination of these factors, habitat on the Forest will likely become more important.

Improperly regulated trapping in high quality habitat may affect the Black Hills marten populations given the extensive road system in the Black Hills (Buskirk 2002). Marten are not currently trapped in South Dakota but may be considered in the future. If properly regulated, trapping would affect individuals but would not threaten the population.

Cumulative impacts would be lowest in Alternative 2 because Standard 3215 specifically protects marten habitat and connective corridors. Alternative 6 would have the most negative impact to the marten and its habitat as the fire-hazard objective (10-01) would result in more of the Forest being in open conditions less preferred or avoided by marten. Hardwood and riparian restoration objectives in all alternatives could have some impact to marten, but the amount and location of spruce treated to meet these objectives would probably have fewer consequences than the fire-hazard treatments.

### 4-7.1.3 Determination and Rationale

**May adversely impact individuals but will not cause a trend to federal listing or a loss of species viability range wide.** Forest Plan guidance could affect the marten in many ways, including through fire-hazard reduction objectives, hardwood and riparian restoration, and timber commodity objectives. However, all alternatives except Alternative 1 contain guidance to provide spruce and movement corridors for marten. Alternatives 2, 3, and 4 would have the least effect on the marten. Alternative 6 has a risk of having greater negative effects than any of these three Alternatives due to the objectives to reduce high fire hazard over 50 percent of the Forest and reduce spruce from current inventories. Alternative 1 would have the most potential for negative effects because it lacks direction specific to marten habitat protection. This alternative does not have an aggressive fire-hazard reduction objective, but many fire-hazard reduction activities are allowed. Due to the expected conservation of most or all mature spruce in all alternatives, the American marten is likely to persist on the Forest over the next 50 years. The above determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the spruce objective for each alternative.

## 4-7.2. Black-Tailed Prairie Dog

Historically, black-tailed prairie dogs were one of the most conspicuous and characteristic residents of the short-grass and mixed-grass prairies of the United States (US Fish and Wildlife Service 2000). At present, the black-tailed prairie dog is found in remnant populations throughout much of its former range, and significant range contractions have occurred in the eastern portion of the species range, including South Dakota (US Fish and Wildlife Service 2000). This range contraction represents approximately 20 percent of the species' original range. Key threats to the persistence of black-tailed prairie dogs include conversion of prairie habitat to

farmland or urban development on private lands, recreational shooting, disease, particularly sylvatic plague; and control programs (poisoning) (US Fish and Wildlife Service 2000).

In February 2000, the US Fish and Wildlife Service (USFWS) determined that listing the black-tailed prairie dog as a threatened species was warranted but precluded by other higher priority actions, and the species was placed on the candidate list (US Fish and Wildlife Service 2000). In August 2004, the USFWS reversed its finding and removed the species from the candidate list. However, the black-tailed prairie dog is still considered a sensitive species by the USDA-Forest Service Region 2. The South Dakota Game, Fish, and Parks Commission (SDGFPC) designated the black-tailed prairie dog as a "species of management concern" effective August 2001, recognizing that prairie dog populations are unique in needing both control and protection (SD Prairie Dog Working Group 2001). In South Dakota, a license is required to shoot prairie dogs, and shooting seasons have been developed for public lands (SD Prairie Dog Working Group 2001). A prairie-dog management plan for South Dakota has been prepared (Cooper and Gabriel 2005). Wyoming currently has no state prairie-dog management plan and no regulations on the shooting of prairie dogs.

Black-tailed prairie dogs are considered a keystone species of the short-grass prairie. Black-footed ferrets, mountain plovers, ferruginous hawks, and burrowing owls, which are all listed as endangered, threatened, or sensitive on the Forest, are dependent on prairie dogs to varying degrees (US Fish and Wildlife Service 2000). Because of the clearly documented dependence of black-footed ferrets on prairie dogs, actions that kill prairie dogs or alter their habitat could prove detrimental to ferrets occupying the affected prairie dog towns.

Black-tailed prairie dogs are associated with short-grass and mixed-grass prairies but require sites with soils conducive to burrowing (NatureServe 2004a). Suitable prairie dog habitat on the Black Hills National Forest is limited to non-rocky grassland soils on the Hell Canyon Ranger District (USDA-Forest Service 2004b), which constitute a fraction of the 110,000 acres of grasslands on the Forest. Based on 2003 monitoring data, the Forest currently has approximately 265 acres of occupied black-tailed prairie dog habitat, consisting of five active colonies, the largest being 151 acres (USDA-Forest Service 2003j). The 2003 acreage represents a 20 percent increase over the estimated acreage of 222 acres in 2002 and a 260 percent increase from observations in 1992 (USDA-Forest Service 2004b). The colonies are comparatively small and disjunct from adjacent known colonies. Prairie dog towns have remained stable or increased in size on the Forest regardless of recreational shooting and disease (USDA-Forest Service 2001c). All of the prairie dog towns on the Forest occur within grazing allotments (USDA-Forest Service 2001a). Black-tailed prairie dogs were found to be more abundant in heavily grazed areas than in un-grazed areas in southwestern South Dakota (Uresk et al. 1982).

### 4-7.2.1 Direct and Indirect Effects

The grassland ecosystem in general would be managed according to Objective 205 and Guideline 2107, which provide guidance for restoring grassland habitats. In Alternatives 1, 2, and 4, Objective 205 seeks to restore grasslands (meadows and prairies) by 10 percent over 1995 conditions. Under Alternatives 3 and 6, Objective 205 seeks to increase the current extent of grassland habitats by restoring 12,000 acres of prairie grasslands (approximately 13 percent increase) and 2,400 acres of meadow habitats (approximately triple the current acreage).

Guidance provided by Objective 205 promotes maintaining or increasing suitable and potentially suitable black-tailed prairie dog habitat. The extent to which Objective 205 would benefit black-tailed prairie dog habitats is limited and is directly related to the amount of suitable habitat (with non-rocky soils conducive to burrowing) targeted for restoration. The majority of restoration efforts would likely occur on soil types not suitable for prairie dogs.

Prairie dogs and associated wildlife prefer short-grass conditions to aid in predator detection. Additional guidance for black-tailed prairie dog habitat is provided by Objective 200-09 to manage for low-grassland structure in the vicinity of prairie dog towns in Alternative 3. In Alternative 6, Objective 200-09 manages for 200 to 300 acres of prairie dog towns in at least 3 colonies. There are currently about 265 acres of prairie dog towns, about 256 acres of which is in three towns. Alternative 6 is the only alternative that provides a measurable management objective for acres of prairie dog towns. No such guidance is provided in Alternatives 1, 2, or 4.

Additional specific direction for black-tailed prairie dogs is contained in each alternative. Standard 3118 emphasizes maintenance of prairie dog populations on the Forest in Alternatives 2 and 4 and prohibits major soil disturbing activities such as road or building construction in existing prairie dog towns under Alternative 3. Maintaining prairie dog towns could be a problem in Alternatives 2 and 4 during wet periods. Standard 3118 provides no emphasis on prairie dog populations or habitats under Alternative 1. To avoid attracting avian predators, new structures or facilities greater than four feet in height in or near prairie dog towns must be designed with low profiles and/or perch inhibitors in Alternatives 3, 4, and 6 (Standard 3100-03). Standard 3100-04 limits new oil-and-gas development to one well per 80 acres in occupied prairie dog habitat in Alternatives 3 and 4. Alternatives 1, 2 and 6 provide no such provisions for new oil-and-gas development or new structures or facilities. Standards 3100-03 and 3100-04 are consistent with prairie dog guidance provided by the Thunder Basin National Grassland Land and Resource Management Plan (USDA-Forest Service 2002b).

Impacts to prairie dogs in the Black Hills include recreational hunting, avian and mammalian predation, and potential for disease. Even with conservation measures to minimize habitat destruction, some habitat may be lost by Forest activities, and the loss of individual animals is possible. However, prairie dog towns have remained stable or increased on the Forest regardless of shooting activities, predation, and disease potential (USDA-Forest Service 2001c).

Recreational hunting will continue on the Forest under state management-plan directives and is not addressed in Phase II Amendment alternatives. Large, healthy populations appear to be able to withstand recreational shooting pressures although small local populations (such as those found on the Forest) already depressed by disease or other adverse influences may suffer additive losses from recreational shooting (US Fish and Wildlife Service 2000). The effects of sylvatic plague may also be exacerbated in small, isolated colonies where populations are not buffered by large numbers and immigration from other colonies may be hampered (US Fish and Wildlife Service 2000).

The resource conservation measures identified above are likely to affect grassland communities and the species that inhabit them. As such, the measures have the potential to maintain and improve habitats suitable for prairie dogs. Prairie dog towns have remained stable or increased on the Forest (USDA-Forest Service 2001c), and are expected be maintained or enhanced by the

above measures. In the absence of sylvatic plague, prairie dogs are expected to persist on the Forest over the next 50 years although their occurrence will continue to be limited in distribution and abundance. Continued monitoring of prairie dog towns and breeding birds, including burrowing owls, will provide valuable information toward maintaining these species and their habitats on the Forest.

### 4-7.2.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Adjacent to the Forest, both Wind Cave National Park and Custer State Park contain prairie dog towns and manage for the maintenance of 445 and 396 acres of prairie dog towns respectively. In the absence of a sylvatic plague epizootic, it is likely that prairie dog populations in these areas and on the Black Hills will persist over the next 50 years; however, their persistence will remain limited and disjunct compared to historic levels. While the extent of the towns on adjacent Federal lands is known, estimates of occupied acreage on adjacent private lands are not available. Continued recreational shooting and poison control efforts on some private lands may result in some localized reduction or extirpation of prairie dog towns in the future. The impact of such shooting and control efforts is unlikely to affect the persistence of prairie dogs in the Black Hills area.

Alternatives 3 and 6 will likey have the least cumulative impacts to prairie dogs due to Objectives 200-02 and 200-09 and Standard 3103 that apply to prairie dogs. Alternatives 1, 2, and 4 do not include this direction.

### 4-7.2.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Because black-tailed prairie dogs are associated with prairie grassland habitats, differences among the alternatives in forested ecosystem management will have little to no effect on black-tailed prairie dogs. Black-tailed prairie dogs are likely to persist in the Black Hills because Forest-wide objectives, standards, and guidelines are designed to conserve and enhance grassland habitat and maintain and protect existing prairie dog towns. Alternatives 1 and 2 represent the highest risk due to the lack of or minimal direction or protective standards specific to prairie dogs or their habitats. Alternatives 3, 4, and 6 represent the least risk due to several protective standards specifically focused on black-tailed prairie dogs and their habitats. Continued monitoring of prairie dog town distribution and density is also important in maintaining prairie dog populations on the Forest. The determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Sylvatic plague will not become a problem in the prairie dog towns.

## 4-7.3. Fringed Myotis

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) gives an overview of distribution and life history for the fringed myotis and is incorporated here by reference.

The Black Hills population of the fringed myotis is a disjunct population and recognized as belonging to a distinct subspecies, *Myotis thysanodes pahasapensis*. The South Dakota Natural Heritage Program gives the fringed myotis a state ranking of imperiled (S2) and the Wyoming Game and Fish Department considers it a species of special concern (Schmidt 2003a).

In the Black Hills, this species is known in Custer, Fall River, Lawrence, and Pennington counties of South Dakota and Crook and Weston County in Wyoming at an elevation between 3,800 and 6,200 feet (Schmidt 2003a). The fringed myotis is a year-round resident of the Black Hills. It can be found during the summer but is very difficult to locate during the winter (USDA-Forest Service 2000b).

The fringed myotis occupies a variety of habitats including mid-elevation desert, grass, and woodland habitats and is found at higher elevations in spruce-fir and in mixed timber (Schmidt 2003a). In the Black Hills of South Dakota, it is one of the more commonly captured bats during summer mist-netting studies and tends to occur along ecotones between ponderosa pine and oak/juniper forests (Schmidt 2003a).

Little is known about hibernacula requirements for this species. The fringed myotis is known to hibernate in the “Heavenly Room” of Jewel Cave. It tends to hibernate in small groups in the head-up position and to isolate itself from other species. Snags, caves, mines, and buildings may be used as roosts (Schmidt 2003a). In the Black Hills, maternity roosts recorded for this species include rock crevices and ponderosa-pine snags (Cryan et al. 2001).

This species feeds mainly on small moths high in the forest canopy or in thick vegetation near the ground (USDA-Forest Service 1996), particularly along stream courses (Schmidt 2003a). Riparian areas and water sources are important features of habitat. Open water is important because bats obtain water while flying. Riparian habitats are important for insect production and provide foraging opportunities (USDA-Forest Service 2000b).

The fringed myotis is more closely associated with the forested environment than other bat species and may be fairly sensitive to forest management, particularly the availability of snags as roost sites (USDA-Forest Service 2000b). The fringed myotis has been documented using ponderosa-pine snags for roosts in the Black Hills (Cryan et al. 2001) and in other regions (Rabe et al. 1998). Although specific snag requirements for fringed myotis have not been developed, Rabe et al. (1998) summarized some key snag characteristics for the fringed myotis and four other bat species in Arizona: roosts were generally in snags with a larger diameter that had more loose bark. DeBlander (2002) estimated 2.7 snags per acre over 11 inches in diameter and 0.3 snags per acre over 19 inches in diameter on the Black Hills. No definition of height is given. For more information on snag densities, see Section 3-2 Forested Ecosystems in the Final EIS.

Human disturbance in or near bat roost sites and hibernacula may cause site abandonment and local population losses. Recreational activities, including spelunking and rock climbing, can also disturb roosting and hibernating bats. The fringed myotis has been documented in the Black Hills roosting in rock crevices on rocky ridges or in steep walled canyons (Schmidt 2003a) that may be popular for rock climbing. Habitat loss can occur with the closure of abandoned mines or the destruction of buildings used by bats. Disturbance to cave and mine openings that change airflow patterns or temperature regimes can also impact bats (USDA-Forest Service 2000a). The fringed myotis has been documented using snags as day roosts in the Black Hills (Cryan et al. 2001). Alteration of forest structure that reduces the availability of suitable roost snags can negatively impact these bats. Alteration of riparian zones that reduces available surface water or reduces mesic vegetation may impact site suitability and prey distribution or abundance for bats.

### 4-7.3.1 Direct and Indirect Effects

For all alternatives, the cave ecosystem in general would be managed according to Objectives 109, 110, 112, and 113 and Guideline 1401. Caves would be managed in accordance with the Federal Cave Resources Protection Act of 1988. Most caves would be managed as wild caves with no facilities to aid or impede use unless specific needs are identified. Ground disturbance would be avoided within 100 feet of natural cave openings for all alternatives except Alternative 2 (Guideline 1401). In Alternative 2, ground-disturbing activities would be avoided within 500 feet of natural cave openings, which is consistent with Pierson et al. (1999). In all alternatives, measures would also be taken to prevent human-caused changes to the cave ecosystem, and if gating is needed to protect cave resources, it will allow free passage of bats, small mammals, air, and water (Guideline 1401). If these measures are followed, cave ecosystems will likely be maintained in good condition in all alternatives, though Alternative 2 has less risk due to the 500-foot buffer around natural cave openings. For more information on caves see Section 3-2.5 Cave Ecosystems in Chapter 3 of the Final EIS.

The riparian ecosystem provides important foraging areas for the fringed myotis. All alternatives seek to maintain or restore historic wet areas, wet meadows, and beaver (Objective 215). Standards 1306 and 1505 and Guidelines 1303 and 9108 (all alternatives) will likely maintain the integrity of existing riparian areas from activities such as timber management, mining, roads, livestock grazing, and traffic. Guidelines 2505 and 2507 (Alternatives 1, 2, and 4) manage grazing in riparian areas to a residual objective; under Alternatives 3 and 6, these are elevated to standards to meet the objective of enhancing riparian habitats. Riparian areas will be maintained or enhanced in all alternatives. For more information on riparian management, see Section 3-2.3 Riparian and Wetland Ecosystems in Chapter 3 of the Final EIS.

The forested ecosystem is also important for fringed myotis, particularly the occurrence of snags. Alternative 1 seeks to maintain 1.08 snags per acre at least 10 inches in diameter and at least 15 feet tall (Objective 211), which is further supported by Standard 2301. In Alternative 1, the low standard for snag density and the 15 feet minimum height standard and the lack of direction for snags larger than 10 inch diameter poses a higher risk for those species requiring a larger diameter or taller snags at higher densities. Still, this alone is not likely to cause the species to not persist on the Forest. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. They would likely persist at much lower densities. Certainly, managing for these conditions present an increased

risk to snag-dependant species, and a higher level of uncertainty as to whether the species will persist on the Forest.

Alternatives 2 and 4 seek to maintain two snags at least 10 inches in diameter and 25 feet tall per acre in ponderosa pine on north and east facing slopes, and 4 snags per acre on south and west facing slopes, which is also supported by Standard 2301. Alternatives 3 and 6 seek to maintain three snags per acre at least nine inches in diameter and at least 25 feet tall. This direction is further supported by Standard 2301, which requires that all snags over 20 inches be retained unless they are a safety hazard and requires that all snags be retained unless they are a safety hazard if the snag densities are below the snag objective (211) within project areas. The snag objective in all alternatives is below the snag density suggested by Rabe et al. (1998) of 4.29 snags per acre. The South Dakota Bat Management Plan (South Dakota Bat Working Group 2004) includes a goal to manage for 8.5 snags per acre greater than 12 inches in diameter. However, snags generally do not occur evenly across the landscape. Some areas are likely to have more snags, such as the areas of recent fires and insect outbreaks, while other areas are likely to have few. As a result, some areas of the Forest will likely have snag densities similar to that suggested by Rabe et al. (1998). Based on this analysis, Alternative 1 presents a higher risk to fringed myotis due to the lower objective for snags. Alternatives 2, 3, 4, and 6 provide adequate snags for fringed myotis, including snags greater than 20 inches, which are most likely to have loose bark for roosting. For more information on snags, see Section 3-2.1 Forest Ecosystems in Chapter 3 of the Final EIS.

Snag densities suggested by Rabe et al. (1998) and the South dakota Bat Working Group (2004) will most likely occur in stand replacing fires and insect outbreaks. Objective 11-03 in Alternatives 3, 4 and 6 provides management guidance for retaining a portion of these conditions as they occur. Alternative 4 provides the highest likelihood these conditions will be maintained. In Alternatives 3 and 6, Objective 11-03 will likely provide sufficient areas of dense snags while allowing some post-fire value recovery. Alternatives 1 and 2 do not include Objective 11-03. However, Mohren (2002) found areas of higher snag density on the Forest even though there was not direction in the Forest Plan similar to Alternatives 1 and 2. There will likely be some areas on the Forest with higher snag densities under Alternatives 1 and 2, but the absence of Objective 11-03 leads to a higher level of uncertainty these conditions will exist.

Additional specific direction for bats is contained in each alternative. All alternatives provide for seasonal closures for known nursery roosts and hibernacula where there are conflicts with people (Guideline 3208). However, Alternatives 3 and 6 specifically mention mines, in addition to caves, and elevate the guideline to a standard. All alternatives seek to conserve known bat nursery roosts and hibernacula (Standard 3207). Alternatives 3 and 6 clarify this standard to avoid vegetative changes within 500 feet of caves and mines that serve as nursery roosts or hibernacula. This is consistent with Pierson et al. (1999) and provides more emphasis on bat conservation.

Alternatives 3 and 6 provide increased protection of potential bat prey by prohibiting the use of insecticides for gypsy moth control within two miles of a known bat hibernacula or maternity roost (Standard 3200-02). This will likely avoid widespread killing of non-target moths and butterflies (prey) in the vicinity of bat concentrations.

### 4-7.3.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Management of national and state parks adjacent to the Forest would have little effect on fringed myotis populations on the Forest. These federal and state lands have suitable habitats for bats. The fringed myotis is known to hibernate in the "Heavenly Room" of Jewel Cave. Management at Jewel Cave National Monument emphasizes protection of cave resources and would likely have positive long-term effects on populations.

Privately owned lands within and adjacent to the Forest boundary may also provide suitable bat habitat, but resource management and conservation by private citizens and companies depends on a number of factors (e.g. desired goals, market prices, development potential, etc.). Some loss of hibernacula and summer or maternity roosts has most likely occurred as a result of abandoned mine closures and recreational caving activities on private lands. Potential bat habitat is expected to occur on private lands across the Black Hills; however, the extent and persistence of such habitats is uncertain. Ongoing urban development in the Black Hills will likely continue to affect foraging habitat, including riparian areas, thereby increasing the importance of habitat on NFS lands. However, given the conservation measures designed into the alternatives for caves, abandoned mines, and riparian areas on NFS lands, in addition to the efforts at Jewel Cave National Monument, the fringed myotis is likely to persist in the Black Hills over the next 50 years.

All alternatives provide for roosting sites; maintain the amount and availability of foraging areas; and protect potential cave hibernacula sites on the Forest. Alternatives 2, 3, 4, and 6 provide snags, including snags greater than 20 inches that are most likely to have loose bark for roosting. Alternative 1 presents the highest potential for cumulative effects to the species due to the lower snag density and height requirements.

### 4-7.3.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Activities across the Forest, including monitoring bats (mist netting), will likely affect individual bats. However, if the above objectives, standards, and guidelines are implemented, the fringed myotis is likely to persist on the Forest over the next 50 years because caves and mines would be managed to avoid disturbance and maintain conditions, riparian areas will be maintained or enhanced, and snags will be provided across the landscape. Alternative 1 carries the highest risk due to its reliance on guidelines rather than standards, the lack of direction for abandoned mines, a lower snag density, and a smaller buffer around natural cave entrances. Alternatives 3 and 6 carry the least risk due to increased reliance on standards for riparian areas, a 500-foot buffer around caves and mines that serve as hibernacula or maternity roosts, higher snag-density objectives, and avoidance of

insecticides for gypsy moth control near known maternity roosts and hibernacula. The determination is based on the following assumptions:

1. The conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

2. Management will move conditions towards the snag objectives in each alternative.

## 4-7.4. River Otter

River otters prefer valley streams but can also be found in lakes, ponds (including beaver ponds) and marshes. Presently, a river otter population does not exist in the Black Hills of South Dakota (Kiesow 2003a, pers. comm.). Two river otter sightings are recorded for the Forest during the early 1990s (South Dakota Natural Heritage Program 2002, USDA-Forest Service, unpublished data) that were likely individuals dispersing from distant populations. No river otter occurrences within the Wyoming portion of the Black Hills are documented (Wyoming Natural Diversity Database 2002).

Kiesow (2003b) evaluated the feasibility of reintroducing the river otter in South Dakota. No re-introduction sites were identified in the Black Hills because the streams are too small and lack adequate water flow to support river otter (Kiesow, 2003a pers. comm.).

### 4-7.4.1 Direct and Indirect Effects

None of the alternatives would affect the river otter due to its absence on the Forest. All alternatives implement conservation measures to maintain and enhance aquatic ecosystems, but stream flows would not be enhanced to the degree necessary to sustain river otter.

### 4-7.4.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

There would be no cumulative effect to the river otter given the absence of direct or indirect effects.

### 4-7.4.3 Determination and Rationale

**No impact.** River otters do not occur on the Forest. All alternatives would maintain or improve stream, lake, and pond habitat conditions, but habitat does not appear to be capable of supporting a resident population.

## 4-7.5. Swift Fox

The 1996 Final EIS BA/BE (USDA-Forest Service 1996, Appendix H) gives an overview of distribution and life history for the swift fox and is incorporated here by reference.

The swift fox inhabits level to gently rolling landscapes of short-to-mid-grass prairies on the western Great Plains, with firm friable soils suitable for excavation of dens (US Fish and Wildlife Service 1995, Kahn et al. 1997). Historically, the swift fox occurred on the Great Plains east of the Rocky Mountains from southern Canada to southeast New Mexico and western Texas (US Fish and Wildlife Service 1995). The current range is a nearly contiguous distribution from Wyoming south through eastern Colorado, western Kansas, the Okalahoma panhandle, eastern New Mexico, and parts of the Texas panhandle (US Fish and Wildlife Service 2001). Scattered populations are also found in Montana, South Dakota, and Nebraska. Population declines have been attributed to the loss of habitat through conversion of native grasslands to croplands, habitat degradation due to control of colonial rodents, vehicle collisions, predation, and interspecific competition with red fox and coyotes (NatureServe 2004a). The coyote is the principal predator of swift fox (Kahn et al. 1997), due to major changes to the faunal community of the western Great Plains ecosystem (US Fish and Wildlife Service 1995). The swift fox is also easily shot, trapped, and poisoned, hence susceptible to mortality from predator and rodent control (Uresk and Sharps 1986, Kahn et al. 1997).

In 1995, the USFWS determined that a threatened listing for the swift fox was warranted but precluded by other higher priority species (US Fish and Wildlife Service 1995). This action prompted 10 states within the historic range of the species, Canada, and several federal agencies including the USFWS to form the Swift Fox Conservation Team (the Team). As a result of the Team's efforts, the swift fox was determined to be more abundant and widely distributed than previously thought and more flexible in its habitat requirements than originally believed. For these reasons, the swift fox was removed from consideration for listing under the ESA in 2001 (US Fish and Wildlife Service 2001). In South Dakota, the swift fox is currently listed as a state threatened species and is considered a species of concern in Wyoming.

Swift fox habitat is comprised of level to gently sloping topography containing an open view of the surrounding landscape, abundant prey, and lack of predators and competitors (Kahn et al. 1997). From 1280-to-2300 acres is generally required to support a pair (US Fish and Wildlife Service 1995). Swift fox dens, used throughout the year as escape cover, protection from extreme weather, and for raising young, are usually located in more barren portions of grasslands on ridges or hill tops (Uresk and Sharps 1986). Swift fox either excavate their own dens or enlarge burrows of other animals. Swift fox are opportunistic foragers, feeding primarily on small mammals, but also on birds, insects, berries, and carrion (Kahn et al. 1997).

In Wyoming, swift fox are present throughout most of their historic range, and the population appears to be stable to increasing over the past few decades. Swift fox are currently present in the southwestern portion of their historic range in South Dakota, and the population appears to be stable to declining over the past few decades (Swift Fox Conservation Team 2003). Badlands National Park is currently implementing a re-introduction program.

It was once believed that there was a close association between swift fox and the prairie dog ecosystem in South Dakota (Hillman and Sharps 1978, Uresk and Sharps 1986). More recent information as noted above, however, has determined the swift fox to be more flexible in its habitat requirements. There are no known historic or recent occurrences of swift fox on the Black Hills National Forest, possibly due to the limited amount of prairie grassland habitat and a small (265 acres) population of prairie dogs (USDA-Forest Service 2003j). There are currently 110,000 acres of grasslands on the Forest, only a small fraction of which would provide firm friable soils suitable for excavation of dens. The large expanses of open prairies needed by the swift fox occur to some degree in the southern portion of the Forest in the Southern Hills Forest and Grassland MA (5.1A) but not to the extent needed to maintain a populations (USDA-Forest Service 2001c). The southern Black Hills, and to some degree the northwest Black Hills, may be suitable transitory habitat for swift foxes moving from one location to another (USDA-Forest Service 2001c).

### 4-7.5.1 Direct and Indirect Effects

The grassland ecosystem in general would be managed according to Objective 205 and Guideline 2107, which provide guidance for restoring grassland habitats by treating encroaching pine. The extent of restoration varies among the alternatives with Alternatives 1, 2, and 4 restoring grassland communities by 10 percent, and Alternatives 3 and 6 increasing grasslands by 13 percent. Similarly, MA Objective 5.1A-205 promotes removal of pine encroachment in grasslands and shrublands. The extent to which Objectives 205 and 5.1A-205 would benefit potential swift fox habitat is limited by the amount of grasslands with soil types suitable for swift fox dens. Implementation of these restoration efforts, regardless of alternative, would not significantly increase the amount of potentially suitable swift fox habitat on the Forest.

Since prairie dogs, swift fox, and other associated species prefer short-or-mid-grass conditions, Objective 200-09 promotes low grassland structure in the vicinity of prairie dog towns in Alternative 3. In Alternative 6, Objective 200-09 manages for 200 to 300 acres of prairie dog towns in at least 3 colonies. There are currently about 265 acres of prairie dog towns, about 250 acres of which is in three towns. Alternative 6 is the only alternative that provides a measurable management objective for acres of prairie dog towns. With Objective 200-02, Alternative 3 also provide for a diverse gradient of structure in prairie grasslands by maintaining 20 percent of such areas with high grass/forb cover. An increase in the diversity of grassland structure would likely provide enhanced foraging habitat for the swift fox. Standard 3100-10 limits prescribed burning in Alternatives 3 and 6 to no more than 60 percent of any contiguous grassland area at a time, which would also benefit foraging habitat diversity. Objectives 200-02 and 200-09 and Standard 3100-10 provide no such guidance in Alternatives 1, 2, or 4.

Impacts to prairie dogs may affect potential swift fox habitat. Recreational shooting of prairie dogs, habitat destruction from oil-and-gas development and from surface disturbing construction activities, and avian and mammalian predation on prairie dogs may also affect swift fox. Standards 3118, 3100-03, and 3100-04 emphasize maintenance of prairie dog towns and provide guidance for development activities (oil and gas, facilities, etc.) in prairie dog towns to varying degrees among the alternatives.

The resource conservation measures identified above are likely to affect grassland communities and the species that inhabit them. As such, they have the ability to maintain and improve habitats potentially suitable for swift fox. Prairie dog towns have remained stable or increased on the Forest (USDA-Forest Service 2001c) and are expected to be maintained or enhanced by the above measures. In the absence of sylvatic plague, prairie dogs are expected to persist on the Forest over the next 50 years although their distribution will continue to be limited. Open prairies needed by the swift fox will continue to occur to some degree in the southern portion of the Forest in the Southern Hills Forest and Grassland MA (5.1A) but not to the extent needed to maintain a population. The southern Black Hills, and to some degree the northwest Black Hills, will continue to be suitable transitory habitat for swift foxes moving from one location to another.

### 4-7.5.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Management of swift fox habitat in the national and state parks adjacent to the Forest is expected have little effect on swift fox. Adjacent to the Forest, Wind Cave National Park and Custer State Park contain grassland habitats and manage for prairie dog towns that provide limited but suitable habitats for the swift fox. Estimates of suitable prairie dog or swift fox habitat on private lands are not available although prairie dog and predator control efforts on private lands may negatively impact swift fox. Suitable habitat for swift fox will likely persist in the Black Hills over the next 50 years; however, habitat will continue to be limited.

There would be no cumulative effect to the swift fox given the absence of direct or indirect effects.

### 4-7.5.3 Determination and rationale

**No impact.** There are no known swift fox occurrences on the Forest. Potentially suitable but limited habitats are expected to be maintained or enhanced with implementation of Forest-wide objectives, standards, and guidelines under all alternatives, by varying degrees depending on the emphasis of the alternative. These conservation measures would provide swift fox habitat but are not likely to affect occurrence, abundance, or distribution of the species due to the current lack of occurrence and the limited amount of potentially suitable grassland habitat on the Forest.

## 4-7.6. Townsend's Big-Eared Bat

The 1996 Final EIS BA/BE (USDA-Forest Service 1996 Appendix H) provides an overview of distribution and life history for the Townsend's big-eared bat and is incorporated here by reference.

Townsend's big-eared bat is considered a species of concern through much of its range in the western United States. This species is a year-round resident in all South Dakota Black Hills counties and reported to be the most numerous bat species in Crook County, Wyoming (Schmidt 2003b). In 1992, it was reported that there were 1,200 Townsend's big-eared bats hibernating in Jewel Cave, making it the largest known hibernating colony of this species in the western United States (Schmidt 2003b). There are four known maternity roosts of these bats in the Black Hills, two of which are on the Forest (USDA-Forest Service 2000a).

Townsend's big-eared bats occupy a variety of habitats but are closely associated with caves and mines (Schmidt 2003b). They also use riparian areas for foraging, including wetlands and meadows (Pierson et al. 1999). Riparian areas account for approximately one percent of public and private land in the Black Hills and are typically located adjacent to streams and around natural springs, seeps, fens, and reservoirs (USDA-Forest Service 1996 p. 3-294). They obtain water while flying over open water (USDA-Forest Service 2001c). Townsend's big-eared bats feed primarily on moths, whose life cycles are dependent upon native forest plants (Schmidt 2003b).

Key habitat components include suitable maternity roost sites and hibernacula. The bats utilize both caves and mines for hibernacula and seem to prefer relatively cold temperatures (ranging from 28.5°F to 62.6°F) (Schmidt 2003b).

In the Black Hills, maternity roost sites are often in steep drainages with nearly vertical walls (USDA-Forest Service 1996). These bats also utilize caves with relatively warm domes or large flat ceilings (Schmidt 2003b).

This species is very sensitive to activities such as recreational caving and mine closings, especially at hibernacula and maternity roosts (Schmidt 2003b). Townsend's big-eared bats are especially susceptible to human disturbance during the active time of year (summer), more so than other bat species (USDA-Forest Service 2000b). Changes to vegetation around cave and mine openings can alter airflow patterns or temperature regimes, which can also impact bats (USDA-Forest Service 2000b).

In fiscal year (FY) 2003, five hibernacula were monitored across the Forest. One structure was a cave, and four were abandoned mines. Townsend's bats were observed at four sites. Cave 1, gated in 1995, occurs within the Jasper Burn. This is the second largest known Townsend's hibernaculum in the Black Hills and is the largest hibernaculum on the Forest. Only Jewel Cave shelters more hibernating individuals. The cave contained 260 Townsend's big-eared bats, which is 20 percent more than it had upon discovery in monitoring year 1994 and 15 percent less than it housed before the observed decline in 2001 (see table below). This could indicate near-recovery from the event or condition that caused the decline. Although the cause of the decline is not known for certain, it could have been the Jasper Fire in 2000. The fire occurred during summer before bats arrived for hibernation, but it resulted in a loss of vegetation. Vegetation around the entrance of caves may regulate temperature and air fluctuations within the cave (USDA-Forest Service 2000b). Early seral plants (e.g., grasses) were well established around the mouth of the cave in 2003, indicating understory recovery from the fire. The gate at the cave entrance had not been breached or vandalized since its installation in 1995 (USDA-Forest Service 2004a).

| **Table C-4.** Number of Bats Observed in Cave 1 Monitoring Years 2000 to 2003 | | | | |
|---|---|---|---|---|
| **Species** | **2000** | **2001** | **2002** | **2003** |
| Townsend's Big-eared Bat | 300 | 218 | 235 | 260 |

Mine 1 contained at least 170 Townsend's bats, which is substantially more than it housed during a 1990s survey. This mine is now the third most populous roost known on the Forest. The bats were roosting in an area of the mine that had shifted open since the previous survey (i.e., underground materials had moved and re-opened an adit). This is unusual because most instances of collapse result in a loss (closing) of habitat. It is unknown if the new habitat availability caused the bats' increased use. This mine was gated in 2003 (USDA-Forest Service 2004a).

Mine 2 revealed two Townsend's bats, one of which was banded. Although the band could not be read, location of it (left forearm) indicated the bat was male. The most recent banding of this species in the Black Hills occurred in 1993, indicating this individual was at least 10 years old or dispersed from another location. Mine 2 was gated in 2003 (USDA-Forest Service 2004a).

Mine 3 represents a newly discovered hibernaculum for Townsend's bat. The mine (and a resident maternal colony of Townsend's bat) was initially discovered during the spring of 2002. This is the first abandoned mine used as a maternity roost in the Black Hills and is one of only a few known maternity mines for the species. This very important mine was gated in 2003 (USDA-Forest Service 2004a).

Protective gates were installed at six abandoned mines and two caves in 2003 (USDA-Forest Service 2004a). A culvert was inserted in the main portal of one of the mines to stabilize it. Without stabilization, the mine was likely to collapse and cease providing roost habitat. An additional (previously installed) gate that had been breeched was fortified.

Townsend's bat has been recorded at all eight of the newly gated sites and was the main impetus for installing the gates. Other bats, including the fringed myotis, will also benefit. Prior to gating, one of the newly gated caves showed a decrease in bats' winter use over the past decade. The decline was likely attributable to recreational use of the cave. Shortly after installation, people seeking entry into the cave breached the cave's gate, demonstrating the continued popularity of the site.

### 4-7.6.1 Direct and Indirect Effects

For all alternatives, the cave ecosystem in general would be managed according to Objectives 109, 110, 112, and 113, and Guideline 1401. Caves would be managed in accordance with the Federal Cave Resources Protection Act of 1988. Most caves would be managed as wild caves with no facilities to aid or impede use unless specific needs are identified. Ground disturbance would be avoided within 100 feet of natural cave openings for all alternatives except Alternative 2 (Guideline 1401). In Alternative 2, ground-disturbing activities would be avoided within 500

feet of natural cave openings, which is consistent with Pierson et al. (1999). In all alternatives, measures would also be taken to prevent human-caused changes to the cave ecosystem, and if gating is needed to protect cave resources, it will allow free passage of bats, small mammals, air, and water (Guideline 1401). If these measures are followed, cave ecosystems will likely be maintained in good condition in all alternatives though Alternative 2 has less risk due to the 500-foot buffer around natural cave openings. For more information on caves see Section 3-2.5 Cave Ecosystems in Chapter 3 of the Final EIS.

Additional specific direction for bats is contained in each alternative. All alternatives provide for seasonal closures for known nursery roosts and hibernacula where there are conflicts with people (Guideline 3208). However, Alternatives 3 and 6 specifically mention mines, in addition to caves, and elevate the guideline to a standard. All alternatives seek to conserve known bat nursery roosts and hibernacula (Standard 3207). Alternatives 3 and 6 clarify this standard to avoid vegetative changes within 500 feet of caves and mines that serve as nursery roosts or hibernacula. This is consistent with Pierson et al. (1999) and provides more emphasis on bat conservation.

All alternatives are consistent with the South Dakota Bat Management Plan (South Dakota Bat Working Group 2004) in that they strive to protect caves and mines that serve at bat roosts or hibernacula. Alternatives 2, 3, 4, and 6 require abandoned mines to be evaluated prior to closing, also a strategy mentioned in the South Dakota Bat Management Plan.

The riparian ecosystem provides important foraging areas for Townsend's big-eared bat. All alternatives seek to maintain or restore historic wet areas, wet meadows, and beaver (Objective 215). Standards 1306 and 1505 and Guidelines 1303 and 9108 (all alternatives) will likely maintain the integrity of existing riparian areas from activities such as timber management, mining, roads, livestock grazing, and traffic. Guidelines 2505 and 2507 (Alternatives 1, 2, and 4) manage grazing in riparian areas to a residual objective; under Alternatives 3 and 6, these are elevated to standards to meet the objective of enhancing riparian habitats. Riparian areas are expected to maintained or enhanced in all alternatives. For more information on riparian area management, see Section 3-2.3 Riparian and Wetland Ecosystems in Chapter 3 of the Final EIS.

Alternatives 3 and 6 provide increased protection of potential bat prey by prohibiting the use of insecticides for gypsy moth control within two miles of a known bat hibernacula or maternity roost (Standard 3200-02). This will likely avoid widespread killing of non-target moths and butterflies (prey) in the vicinity of bat concentrations.

### 4-7.6.2 Cumulative Effects

Cumulative effects result from the incremental impact (direct and indirect effects) associated with the alternatives when added to past, present and reasonably foreseeable actions. Past activities on National Forest System lands in the Black Hills are accounted for in the existing condition displayed under direct and indirect effects. Other Federal and non-Federal activities are discussed here.

Management of national and state parks adjacent to the Forest would have little effect on Townsend's big-eared bat populations on the Forest. These federal and state lands have suitable

habitats for bats. Jewel Cave, for example, is a significant hibernacula for Townsend's big-eared bats in the area. Management at Jewel Cave National Monument emphasizes protection of cave resources and would likely have positive long-term effects on populations.

Privately owned lands within and adjacent to the Forest boundary may also provide suitable bat habitat, but resource management and conservation by private citizens and companies depends on a number of factors (e.g. desired goals, market prices, development potential, etc.). Some loss of hibernacula and summer or maternity roosts has most likely occurred as a result of abandoned mine closures and recreational caving activities on private lands. Potential bat habitat is expected to occur on private lands across the Black Hills; however, the extent and persistence of such habitats is uncertain. Continued urban development in the Black Hills will likely continue to affect foraging habitat, including riparian areas, thereby increasing the importance of habitat on NFS lands. However, given the conservation measures designed into the alternatives for caves, abandoned mines, and riparian areas on NFS lands, and the efforts at Jewel Cave National Monument, Townsend's big-eared bats are likely to persist in the Black Hills over the next 50 years.

Alternatives 3 and 6 are likely to have the least cumulative effects because they include abandoned mines in many of the standards, avoid vegetative changes within 500 feet of caves and mines that serve as nursery roosts or hibernacula (Standard 3207), and prohibit the use of insecticides for gypsy moth control within two miles of a known bat hibernacula or maternity roost (Standard 3200-02). Alternative 2 has a 500-foot buffer around natural cave openings (Guideline 1401), but lacks direction on abandoned mines. Alternative 4 lacks the 500 foot buffer around cave, nursery roosts or hibernacula, and lack directioin for abandoned mines. Alternative 1 is likely to have the most cumulative effects due to its reliance on guidelines rather than standards, the lack of direction for abandoned mines, and a smaller buffer around natural cave entrances.

### 4-7.6.3 Determination and Rationale

**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Activities across the Forest, including monitoring bats (mist netting), will likely affect individual bats. However, if the above objectives, standards and guidelines are implemented, Townsend's big-eared bats are likely to persist on the Forest over the next 50 years because caves and mines would be managed to avoid disturbance and maintain conditions and riparian areas will be maintained or enhanced. Alternative 1 carries the least certainty due to its reliance on guidelines rather than standards, the lack of direction for abandoned mines, and a smaller buffer around natural cave entrances. Alternatives 2, 3, and 6 carry the most certainty due to increased reliance on standards for riparian areas, a 500 foot buffer around hibernacula and maternity roosts, and avoidance of insecticides for gypsy moth control near maternity roosts and hibernacula. This determination is based on the assuption that the conservation objectives and protective standards and guideline direction listed above for the various alternatives will be applied or implemented as written.

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