Wildlife Resource Report
and
Biological Assessment/Biological Evaluation

Black Hills Resilient Landscapes Project

USDA Forest Service, Black Hills National Forest

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Introduction

This report analyzes and discloses the effects to wildlife and their habitat in the Black Hills Resilient Landscapes (BHRL) project area on the Black Hills National Forest (BHNF) and serves as a Biological Assessment (BA) for federally listed Threatened and Endangered species, a Biological Evaluation (BE) for Region 2 sensitive species, and a Wildlife Report for Management Indicator species (MIS), Species of Local Concern (SOLC), migratory birds and other emphasis species of the Black Hills.

The report considers the habitat needs for wildlife species and potential changes to that habitat resulting from proposed BHRL activities. Data in this report were compiled from field surveys, District wildlife observation data, Rocky Mountain Bird Observatory (RMBO) surveys, literature reviews, communication with District personnel across the Forest, and the BA/BE completed for the Black Hills National Forest Land and Resource Management Plan Revision (Forest Plan) and the Phase II Forest Plan Amendment (USDA-Forest Service 1996, 2005). It is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536 (c)), and follows standards established in Forest Service Manual (FSM) direction (2672.42) and the Code of Federal Regulations (50 CFR §402) and tiers directly to the revised Forest Plan and the Phase II Forest Plan Amendment EIS (USDA-Forest Service 1996, 2005) and the associated Biological Assessment/ Biological Evaluations (BA/BE), (Appendices H and C respectively). The Forest Plan, as amended, provides direction and ensures compliance with applicable laws, regulations and policies. BHRL activities implemented consistent with the Forest Plan likewise ensure compliance with relevant law, regulation and policy.

Forest Plan goals and objectives for the BHRL project area and for wildlife resources are to provide a variety of life through the management of a biologically diverse landscape. These goals and objectives along with the Forest Plan Standards and Guidelines seek to provide and maintain an appropriate mix and balance of habitats over the long term. This diversity of habitats is intended to maintain populations of all vertebrate and invertebrate wildlife and plant species in the area. A variety of wildlife recreational opportunities, ranging from consumptive to non-consumptive activities (e.g. hunting/fishing to wildlife viewing) will also be provided.

Project Description

Purpose and Need

The Black Hills National Forest is proposing actions to move landscape-level vegetation conditions in the project area toward objectives of the Forest Plan in order to increase ecosystem resilience to insect infestation and other natural disturbances, contribute to public safety and the local economy, and reduce risk of wildfire to landscapes and communities.

Area Affected by the Project

The project area includes National Forest System (NFS) lands that are managed by the Black Hills National Forest within the areas designated by the Secretary of Agriculture under the amended Healthy Forests Restoration Act (HFRA, 16 U.S.C. 6591), excluding Inventoried Roadless Areas and certain management areas. The project area includes approximately 1,098,425 acres of NFS lands.

The project area includes the following management areas (MAs).

MA	Emphasis	Acres*	Proposed activities
3.31	Backcountry motorized recreation	6,870	Fuels/hazard trees
3.32	Backcountry non-motorized recreation	8,948	Fuels/hazard trees
3.7	Late succession landscapes	18,484	Fuels/hazard trees
4.1	Limited motorized use and forest products	41,374	All
5.1	Resource production	558,520	All
5.1A	Southern Hills forest and grassland	27,845	Fuels/hazard trees
5.2A	Fort Meade VA Hospital watershed	3,299	Fuels/hazard trees
5.4	Big game winter range	388,950	All
5.43	Big game and resource production	10,083	All
5.6	Forest products, recreation, and big game	34,043	All
*MA acres in project area	Total	1,098,425	

Alternatives Considered

Alternative A – Proposed Action

The Forest Service is proposing to conduct the following land management activities in the project area, starting in approximately 2018 and continuing for about 10 years.

Fuel Reduction and Prescribed Fire

To increase ecosystem resilience and reduce wildfire hazard to landscapes and communities, the proposal includes mechanical fuel treatments (up to 7,000 acres per year), prescribed fire (up to 10,000 acres a year), and hazard tree removal. Total acres implemented annually would depend on budget constraints and, for prescribed burning, weather conditions. Priority criteria for treatment include wildland-urban interface (specifically, within one-half mile of at-risk communities and within 300 feet of other private property) and areas adjacent to egress roads and critical infrastructure.

Activities described in the following sections (precommercial thinning, removing encroaching pine, etc.) also would contribute toward fuel reduction goals.

Enhancement of Non-pine Vegetation and Within-stand Diversity

The project would cut encroaching pine from areas of hardwoods and grasslands. Pine and spruce removal from aspen stands would take place on up to 6,000 acres. On up to 30,900 acres of pine stands, pine and spruce would be removed from aspen inclusions. Regeneration of declining aspen stands would occur on up to 4,000 acres. Pine removal from oak stands would take place on up to 5,400 acres. Pine would be cut from encroached grasslands on up to 14,200 acres. Uneven-age management would occur on up to 10,000 acres of SS 4A stands.

Pine Structural Stage (SS) Modification

These activities would occur in MAs 4.1, 5.1, 5.4, 5.43, and/or 5.6. Structural stage percentages comparing existing to desired conditions are shown below.

SS	Objective* (Percent)	Management Area (Existing Percent of Pine Acres)				
		4.1	**5.1**	**5.4**	**5.43**	**5.6**
1	**5**	1	6	14	28	3
2	**5**	8	7	3	13	3
3A	**10**	7	8	6	3	5
3B	**15**	3	4	7	4	1
3C	**5**	3	2	4	6	1
4A	**25**	52	55	37	28	51
4B	**25**	17	14	19	12	27
4C	**5**	8	4	9	6	7
5	**5**	1	<1	<1	0	2

**Forest Plan objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204*

Overstory removal would occur on up to 185,210 acres of SS 4A stands (Commercial Treatment Areas; CTAs). This treatment would decrease 4A and increase younger structural stages, which are generally below Forest Plan objectives. Precommercial and/or POL thin would occur on up to 25,000 acres per year to increase SS 3A and 3B and to promote growth toward 4B.

Patch cuts would occur on up to 1,300 acres in MA 4.1 and 600 acres in MA 5.6. This treatment would produce SS 1, which is below Forest Plan objectives in these MAs. Tree planting would occur on up to 5,000 acres per year in large burned areas in the southern Black Hills.

Mechanical site preparation would occur in open, mature pine stands on up to 4,000 acres in the western Black Hills where thick sod hinders establishment of pine seedlings. This action would expose soil, creating conditions favorable for establishment of pine.

Summary Table

Maximum activity acres and miles are displayed below. The amount implemented may be less.

Fuel and hazard tree treatments	
Mechanical and manual fuel treatments *(shaded fuel break construction; thin, pile, and burn fuels; scatter, shred, or chip fuels; cut, lop, and scatter fuels); includes up to 4,000 acres of shaded fuel breaks with commercial removal*	70,000 acres (7,000 acres per year)
Prescribed fire	100,000 acres (10,000 acres per year)
Hazard tree treatments	As needed and funded
Enhancement of non-pine vegetation and within-stand diversity	
Removal of pine/spruce from aspen stands	6,000 acres
Regeneration of aspen stands	4,000 acres
Removal of pine/spruce from aspen inclusions (possibly commercial)	22,500 acres

Removal of pine/spruce from aspen inclusions (non-commercial)	8,400 acres
Removal of encroaching pine from oak stands	5,400 acres
Removal of encroaching pine from grasslands	14,200 acres
Uneven-age individual tree selection or group selection	As stand conditions allow (max. 10,000 acres out of the 185,210 acres below)
Pine structural stage modification	
Overstory removal *By management area:* *MA 4.1: Approximately 7,670 acres* *MA 5.1: Approximately 129,890 acres* *MA 5.4: Approximately 41,210 acres* *MA 5.43: Approximately 250 acres* *MA 5.6: Approximately 6,190 acres*	185,210 acres
Precommercial and/or POL thin	250,000 acres (25,000 acres per year)
Patch cut *By management area:* *MA 4.1: 1,300 acres* *MA 5.6: 600 acres*	1,900 acres
Tree planting *(MAs 5.1, 5.4, and 5.43)*	5,000 acres
Mechanical site preparation	4,000 acres
Connected actions	
Road construction – Specified	18 miles
Road construction – Temporary	39 miles
Temporary roads on existing templates	182 miles
Road conversion (unclassified to system)	20 miles (part of 182 miles above)
Road maintenance	2,500 miles (estimated)
Road reconstruction	375 miles (estimated)

Alternative B – No Action

This alternative serves as a baseline for comparison of environmental consequences and is a management option that could be selected by the deciding official. Under this alternative, the proposed activities would not occur. Ongoing and reasonably foreseeable actions would continue, including timber harvest, precommercial thinning, prescribed fire, fuel reduction, noxious weed treatment, recreation, development of private land, prospecting and mining, livestock grazing, and use of surface and ground water. Vegetation structure would change over time through natural growth and mortality and events such as wildfires, storms, and insect and disease outbreaks.

Design Features

Forest Service Manual and Handbook direction, Regional Watershed Conservation Practices (WCPs, Forest Service Handbook 2509.25), Forest Plan standards, guidelines, goals and objectives, South Dakota and Wyoming Best Management Practices and other management requirements apply to the proposed activities. Additional BHRL-specific design features are identified as part of the proposed action (see the Proposed Action description in the EIS).

Analysis Methods
A pre-field review was conducted utilizing wildlife species information to describe habitat requirements for all special status wildlife species. Sources of this information included BHNF wildlife biologists, BHNF records and files, NRIS-Wildlife database, South Dakota Department of Game, Fish and Parks (SDGFP), Wyoming Game and Fish Department (WGFD), published research and reports derived from field work conducted in the Black Hills and elsewhere. The information served as the basis for determining the effects of the alternative on wildlife species.

Impact analyses on wildlife species was conducted using existing data and the habitat requirements for each species. Habitat requirements were used to determine the effects of the alternative on each wildlife species. The habitat impacts and risks to species were estimated based on the best available science and data. Conclusions and determinations were derived from anticipated trends, probable risks, and degree of uncertainty under the proposed alternative.

Wildlife species effects are based primarily on direct impacts on wildlife (mortalities, collisions, etc.) and indirect impacts of habitat changes and disturbance. The effects of disturbance to wildlife are based on potential miles of new motorized routes open to public use and potential acres of vegetation treatments as well as the seasonality of these activities. Habitat changes were analyzed based on the amounts of potential treatments proposed.

The indirect and cumulative impacts analysis are bounded in time as the next 10 years. This temporal scale is based on the time over which one can expect to predict reasonably foreseeable actions. Some longer term (10-100 year) impacts are projected, but accurate prediction of these effects become speculative.

For wildlife species (with the exception of elk, white-tailed deer and raptors), the spatial scale for cumulative impacts analysis generally encompasses the area within the Forest boundary. This area was chosen because it encompasses similar ecosystem components and species' home ranges/territories that occur on the Forest. Cumulative impacts extended beyond the BHNF boundary (5 mile buffer) for deer, elk and raptors because they are mobile species with large home ranges and seasonal ranges, frequently located outside the BHNF boundary. All references to Forest Plan structural stage objectives in relevant MAs refer to Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204 and 5.6-204.

Field Surveys
Wildlife occurrence and distribution was based on existing survey information and assumptions based on habitat suitability. Field reconnaissance has occurred incidental to work on other projects and various field trips. Additional surveys may occur as needed to identify areas to protect and seasonal restrictions when specific activities are implemented. Under some circumstances, it is acceptable to analyze and document expected effects based on the assumption that a certain species is present, in lieu of conducting site-specific surveys (USDA Forest Service 2015a; FSM 2672.43-Exhibit 01).

Assumptions
- Project implementation will comply with the Forest Plan and all other relevant direction.
- All figures are approximate.

- Actual acres/miles implemented would depend on weather, priorities, funding, and other factors.
- Proposed activities will be implemented as designed.
- Mapped stand boundary locations are approximate. Stand delineation is subject to corrections based on field review.
- Proposed road construction mileage is a maximum that would provide access to all possible SS 4A commercial treatment stands. Miles of road actually constructed may be less than the maximum, roughly proportional to the 4A acres actually treated.
- Proposed non-commercial treatments will use the existing road system, as modified in conjunction with commercial treatments.
- Timber sales currently scheduled for sale, and those that have been sold but not yet cut, will occur as planned.
- The habitat structural stage percentages as defined in the existing condition include implementation of the Mountain Pine Beetle Response Project (MPBRP) which include timber sales anticipated to be sold in FY2018.

Impacts on Wildlife Habitat

Alternative A - Proposed Action

Vegetation management activities that generate loud noise from motorized equipment may disturb and/or displace wildlife such as goshawks and other nesting raptors. These effects tend to be more adverse when they occur during reproductive seasons when adults and young are more vulnerable to disturbance or during the winter when species may be stressed due to weather and reduced food supplies.

Overall, proposed vegetation management activities are expected to move most targeted habitats toward desired conditions identified in the Forest Plan. The “coarse-scale” approach to provide diversity for forest-dependent species is represented by the structural stage objectives. Dense, mature pine forest (which is below objectives in some management areas due to past wildfires, the mountain pine beetle epidemic, and subsequent response treatments) may require decades to increase to objective levels. Forest structural diversity design features promote the retention of some existing mature forest in treatment areas when opportunities arise. Snag abundance, which is currently above levels specified by Forest Plan objective 211, will decline in the future under both alternatives as existing snags fall to the ground. The Proposed Action would remove some snags that pose a safety hazard to human life and property or during prescribed burning operations, but otherwise complies with standards 2301 and 2305 to retain snags.

In general, prescribed fire is expected to have positive effects on wildlife habitat. Prescribed fire may create some smaller-diameter snags for wildlife use, depending on the mortality level identified in the burn prescription. For a species like the black-backed woodpecker, which is adapted to natural disturbance events, prescribed fire has some benefit, but not to the same degree as wildfire and insect epidemics (Rota et al. 2014a). The timing of prescribed burning typically occurs outside the breeding season for most wildlife species, with some exceptions, thereby avoiding the time of year when adults and young may be more susceptible to injury/direct mortality or disturbance/displacement.

Prescribed fire prescriptions typically result in lower flame heights, reduced burn intensity, slower rate of spread, and thus less heat/smoke than wildfire. This in turn reduces tree mortality, impacts on soils, and general severity of effects. Based on these factors, negative effects on most wildlife species are avoided or minimized. Some ground-based species with limited mobility, such as land snails, are more susceptible to adverse effects from prescribed burning.
Road-related activities may affect wildlife and its habitat. Similar to vegetation management activities, construction, maintenance, and use of roads may generate loud noise from heavy equipment that may create a zone of disturbance and/or displace wildlife, with effects being more harmful during breeding seasons and winter. Species lacking mobility, such as land snails, may be vulnerable to injury or mortality from road construction at any time of year. Road use may have greater seasonal impacts on species like the Black Hills redbelly snake, which may bask on roads or cross roads when moving to and from winter hibernacula. The proposed 18 miles of new roads would not increase open road density because they would be closed to public motorized use after the project.

Road construction is likely to result in the modification of wildlife habitat. In the case of permanent roads and conversion from unclassified to system roads, this change may be permanent. An estimated 25 acres of vegetated habitat is predicted to be permanently modified due to roads. The 18 miles of new road proposed would result in additional habitat fragmentation. The resultant effects on wildlife will differ by species, the length/width of the road template, the location of the road (ridgeline, midslope, valley bottom) and the habitat affected among other factors. Linear openings created by roads in forested habitat may be used as foraging or travel corridors by some wildlife species. Impacts from new temporary roads (39 miles) are typically short-term as revegetation occurs during the growing season after use has ended. Additional analysis of road-related impacts on aquatic habitat can be found in the Soil and Water Specialist Report.

Alternative B - No Action
Throughout the BHNF, forest succession would largely be allowed to take place over time without additional vegetation activities, human activity and disturbance proposed in the BHRL project. Vegetation structure would change over time through natural growth and mortality events such as wildfires, storms, insects and disease outbreaks. Changes would also occur through on-going activities, such as Forest protection efforts, fire suppression, noxious weed treatment, and recurring road maintenance on system roads as directed by the Forest Plan.

The BHNF would generally increase in ponderosa pine density and extent. Ponderosa pine forests would mature into larger trees and expand in distribution to become the dominant tree species in some areas currently dominated by hardwoods, grasses (meadows) and riparian and wetland habitats. White spruce habitat will likely increase and expand with no vegetation activities in spruce stands.

Uncertainty exits regarding the occurrence of wildfires and future climatic patterns, regenerating ponderosa pine will likely increase across the BHNF landscape and expand into other habitats. Ponderosa pine is a prolific regenerating tree species on the BHNF. Risk of wildfires and insect infestations will likely increase. Wildlife, such as woodpeckers, would benefit from and are dependent on habitat created by wildfires and insects.

Wildlife species adapted to and requiring dense, mature pine stands would be maintained or may benefit from increased habitat. Some benefitted wildlife species include the northern goshawk, brown creeper, golden crowned-kinglet, northern flying squirrel and American marten. Other species adapted or requiring open pine, hardwoods, grasslands, riparian areas and wetlands would likely face decreases to suitable habitat. Species facing negative impacts of decreased habitat include grasshopper sparrow, black and white warbler, song sparrow, monarch butterfly, meadow jumping mouse and black-tailed prairie dog.
Wildlife species requiring open forest conditions, hardwoods, grasslands, riparian areas and wetlands would be dependent on natural processes (wildfire, storms, insects and disease) to retard succession and provide needed habitat. Provision of these habitats would be uncertain and unpredictable. And species that use these habitats may realize decreases in suitable habitat as ponderosa pine stands expand with forest succession.

Most wildlife species have some beneficial, neutral or negative impacts to either alternative A and/or alternative B. Overall, the analysis of impacts depends on the quality and quantity of changes to habitat and range of suitable habitats available. Some species are more adaptable to change while others are not.

Effects to species dependent on mature, dense and late-successional Ponderosa Pine stands
In a managed, resilient ecosystem the importance of mature, dense canopy and late-successional landscapes and its presence across the landscape becomes greatly magnified. This habitat serves as refugia for various wildlife species and the natural processes that support them. Some species requiring this habitat on the BHNF include the northern goshawk, brown creeper, black-backed woodpecker, flammulated owls, broad-winged, sharp-shinned and Cooper's hawks, saw-whet owls, pygmy nuthatches, northern flying squirrels and the golden-crowned kinglet. For these species, and additional species whose habitat they represent, the quantity of mature, dense and late-successional habitat (4B, 4C and 5) combined is below the desired percentage in the habitat structural stage objectives.

Snags and Down Woody Material
Snags and down woody material provide homes, security cover and foraging habitat for countless animals, from beetles to bears. Snags are an important habitat component for cavity nesting birds and mammals. The majority of the snags on the Forest are ponderosa pine. Forest Plan Objective 211 direction is to provide 3 hard snags greater than 9-inch diameter at breast height (dbh) and 25 feet tall per acre, well dispersed across the Forest, 25 percent of which are greater than 14-inch dbh, within a management area in conifer-forested portion of the Forest (USDA-Forest Service 2006). Forest Plan Standard 2301 provides direction to retain all snags greater than 20-inch dbh unless they are a safety hazard. If snag densities within a project area are below Objective 211, retain all snags unless they are a safety hazard. If large snags (>14-inch dbh) are not available, retain snags in the largest size class available. This standard does not apply to areas salvaged under Objective 11-03. All soft snags should be retained unless they are a safety hazard (USDA-Forest Service 2006).

Forest Plan Standard 2308 provides direction to retain an average of at least 50 linear feet per acre of down woody debris with a minimum diameter of 10 inches during vegetation

management activities in ponderosa pine forested sites (USDA-Forest Service 2006). Large and small wood debris across the forest floor provide homes, cover from predators and foraging habitat for many bird and mammal species.

Current conditions across the BHNF include large areas of pine beetle damage and aging wildfire habitats and has created more snags and downed wood in recent years across the BHNF. Areas where mountain pine beetles (MPB) were active generally have higher snag and down woody material and snag clumping is common. Snags created by MPB have short life spans and will typically fall within 5 to 7 years, contributing then, to down woody habitat. Currently adequate snags and large woody debris exist across most of the project area.

Riparian Habitat

Riparian habitat is located along the edges of streams and wetlands. It is the transitional zone between the aquatic habitat and the upland terrestrial habitat and is defined by soils, vegetation and water. Riparian habitat is important to all terrestrial and aquatic species because of their basic need for water. The Forest is directed to manage for high quality riparian communities by providing stable stream banks, retaining woody vegetation along streams and lakes, and providing large woody material for aquatic species (USDA-Forest Service 2006, Guideline 3212). The Forest provides riparian habitat diversity through vegetation treatments in conjunction with other habitat improvement activities (USDA-Forest Service 2006, Guideline 3211). In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, only those actions that maintain or improve long-term stream health and riparian ecosystem condition are allowed (USDA-Forest Service 2006, Standard 1301). Long-term ground cover, soil structure, water budgets, and flow patterns in wetlands are maintained to sustain their ecological function, per 404 regulations (USDA-Forest Service 2006, Standard 1302). Log landing, decking areas and mechanical slash piling are prohibited within riparian areas unless the integrity of the riparian area can be protected (USDA-Forest Service 2006, Standard 1306). Vegetative type conversion should only be done in riparian areas to reestablish riparian vegetation for the protection and/or enhancement of those ecosystems (USDA-Forest Service 2006, Guideline 1303).

Specific to the BHRL project, any vegetation activity, if close to or contacting riparian or wetland areas may result in localized short-term degradation of habitat. Some localized, minor negative impacts are anticipated. However, overall water quality and quantity and riparian and wetland habitats are expected to be maintained and may be enhanced due to tree removal in commercial and non-commercial thinning activities and prescribed fire.

Management Indicator Species (MIS)

Trends in MIS or their habitats are representative of a variety of habitats and can indicate overall changes in the forest ecosystem. MIS also suggest the welfare of other species with similar habitat needs. MIS are used to assess the impacts of management activities on themselves, other species and the quality and quantity of the habitat they occupy. MIS will generally be monitored using trends in habitat: however, when available, population trends may be used as an indicator of management response. Cumulative impacts analyses for the following species are bounded by the BHNF except for white-tailed deer. White-tailed deer are migratory and utilize winter ranges

on private lands surrounding the BHNF. For the purposes of this analysis, cumulative impacts analyses for deer extend from the BHNF boundary to a five mile buffer surrounding the BHNF.

Population viability was evaluated in the Phase II Forest Plan Amendment FEIS. The Phase II Amendment FEIS determined that there would be adequate habitat for maintaining viable population if standards and guidelines are followed, and if conditions move towards habitat objectives. Monitoring of MIS is accomplished through coordinated efforts involving US Forest Service biologists, District data, research, contracted monitoring surveys and State agencies. More information on MIS monitoring can be found in the Forest Monitoring and Evaluation Report (USDA-Forest Service 2015b).

MIS species considered in this report are:

- White-tailed deer (*Odocoileus virginianus*)
- Beaver (*Castor canadensis*)
- Black-backed woodpecker (*Picoides acticus*)
- Brown creeper (*Certhia americana*)
- Golden-crowned kinglet (*Regulus satrapa*)
- Grasshopper sparrow (*Ammodramus savannarum*)
- Ruffed grouse (*Bonasa umbellus*)
- Song sparrow (*Melospiza melodia*)
- Mountain sucker (*Catostomus platyrhynchus*)

White-tailed deer

White-tailed deer inhabit a wide variety of habitats and are extremely adaptable, making this species the most widespread deer in North America. White-tailed deer live in every habitat type, including grasslands, mountains, deserts, tropical rainforests, swamps and urban settings (Higgins et al. 2000). In the Black Hills, white-tailed deer inhabit a variety of forest types and structural stages. The BHNF has designated the white-tailed deer as a MIS for early successional ponderosa pine forests (Sieg and Severson 1996). White-tailed deer in the Black Hills migrate between distinct summer and winter ranges. Hardwood stands of aspen and birch are prominent features in white-tailed deer's selection of home ranges and their use of sites within these ranges (Stefanich 1995). Kennedy (1992) suggested aspen stands are highly selected during fawning. There are 44,184 acres of aspen and birch habitat within the BHNF. There are also 56,512 acres of mixed pine and aspen that contribute to selected deer habitat. White-tailed deer in the Hills are largely migratory and during winter, most deer move to privately-owned winter ranges that include lower elevation forests that offer cover and browse, and open habitats adjacent to wooded draws (Stefanich 1995). The BHNF is utilized in all seasons, but less so during late winter (January-April) by white-tailed deer when deep snows often preclude use and plant phenology is not conducive to foraging.

Forage and habitat preferences change seasonally. During summer, deer in the northern Hills prefer hardwood stands of aspen and birch (Kennedy 1992, Stefanich 1995). During winter in the central Black Hills, white-tailed deer selected dense young ponderosa pine/deciduous mixed forests and open burned ponderosa pine/ grass habitats (DePerno et al. 2002). In the northern Black Hills in winter, low-growing shrubs such as Oregon grape and bearberry are important

forage during mild winters, but in severe winters with deep snow, ponderosa pine needles, bur oak twigs, and common juniper are consumed (Hill 1946, Schenck et al. 1972, Schneeweis et al. 1972, Sieg and Severson 1996). Forbs have been reported to dominate the white-tailed deer diet in the Black Hills in the summer (Schenck et al. 1972, Sieg and Severson 1996). However, in the central Black Hills, DePerno et al. (2002) reported populations ate mostly graminoids and moderate amounts of shrubs and forbs.

Forage production can be increased through logging, prescribed burning, ponderosa pine stand thinning, and pine litter reduction (DePerno et al. 2002). Prescribed burning of browse species such as chokecherry, serviceberry, and aspen can be beneficial since these species are prolific root or crown sprouters. Thinning ponderosa pine stands allows more sunlight to reach the forest floor and increases forage production (Uresk and Severson 1998). In mixed oak-pine stands, selective removal of pine trees may enhance reproduction of oak and associated shrubs (Sieg and Severson 1996). This is predominately evident in the northern Black Hills.

Road construction and road density can affect deer habitat. High road densities (miles of road/square mile area) alter both human and animal behavior, which contribute to animal displacement and stress (SAIC 2003). Roads may cause a direct loss in habitat and increased vehicular volume may indirectly degrade habitat quality. In the 1990s up to 1,400 deer per year were killed in vehicle collisions in the Black Hills (Parrish et al. 1996). Screening cover is defined as: being able to hide 90% of an adult deer or elk from human view at a distance of 200 feet or less (of the road). There are many collector and arterial roads in the project area where the screening cover requirement (Guideline 3203) applies. The project area consists of denser ponderosa pine stands (Structural Stages 2, 3B, 3C, 4B, and 4C) which is screening cover for deer.

White-tailed deer numbers are increasing across the Black Hills. In the South Dakota portion of the BHNF, the population in 2016 was estimated to be approximately 51,000 animals (Robling 2017). The SDGFP Deer Management Plan, 2017-2023, provides historical background and biological information for the formulation of sound deer management. Within the Wyoming Black Hills, the increasing white-tailed deer population was estimated at 52,080 in 2015 (Sandrini 2016). White-tailed deer are currently above the population objective in South Dakota and 5% below objective in Wyoming. Forest wide, foraging habitat is increasing and security and thermal cover habitat is decreasing (USDA-Forest Service 2015b). This deer is very common throughout the project area. Impacts from this project are expected to have negligible impacts to habitat and deer numbers Forest wide. The BHRL project is consistent with Objectives 217 and 238. Under either alternative, white-tailed deer are likely to persist on the Forest.

Direct and indirect impacts:
Alternative A
Proposed activities would result in younger, more open forest, indicating an increase in deer foraging habitat and a decrease in security and thermal habitat. Activities that remove or thin pine would reduce screening cover for up to a decade and thermal cover for up to 20 years. Aspen enhancement would increase preferred summertime habitat, while oak enhancement would benefit fall and winter habitat. The project would contribute toward achievement of Forest

Plan objectives 217 (*"Maintain habitat for game and fish populations at the state objectives in effect in 1996"*) and 238a (maintain or enhance habitat for MIS) by conserving or enhancing white-tailed deer habitat.

Alternative B
No direct impacts (mortalities) are anticipated. Project area is expected to maintain current mature, large trees and develop dense, young pine regenerating stands that will become a dominant landscape component in the absence of wildfires and insects. Deer foraging habitat is expected to decrease and security and thermal cover habitat expected to increase. Pine expansion into grassland, aspen and oak habitat will likely decrease deer habitat.

Summary
Overall, alternative A would likely improve white-tailed deer habitat more than alternative B. White-tailed deer will persist under either alternative.

Beaver
The American beaver (*Castor canadensis*) was selected as an MIS because of its influence on riparian/aquatic habitat conditions and its status as a keystone species (USDA-Forest Service 2005). Beaver are found in suitable habitat throughout much of North America, ranging as far south as northern Mexico. Beaver are semi-aquatic and occupy large rivers and lakes with constant water levels, marshes, small lakes, and streams with weak flows adequate for damming (Higgins et al. 2000). General habitat requirements of beaver include suitable riparian habitat dominated by stands of willow, aspen, or cottonwood.

In Wyoming and South Dakota, beaver are widely distributed and ranked apparently secure (S4), and secure (S5), respectively (NatureServe 2006). Likely limits to persistence include degradation and/or loss of riparian shrubs and forests due to historical management activities, as well as the loss of hardwood components on adjacent uplands. Early explorers noted the abundance of beavers in the Black Hills (Parrish et al. 1996). Beavers were heavily trapped in the Black Hills, and by the late 1800s beaver populations were low and restricted to remote portions of the Black Hills (Parrish et al. 1996). During the 1930s, efforts were made to increase beaver populations in the Black Hills; harvest restrictions were imposed, and populations were supplemented with animals from the eastern part of South Dakota (Parrish et al. 1996). Beaver are periodically transplanted onto the Forest in cooperation with State Game and Fish agencies.

Beaver abundance and distribution were last monitored in 2012, and has occurred on a 5-year basis. A Forest survey in 2007 estimated about 38 beaver colonies on the Forest (USDA-Forest Service 2010). A Forest wide beaver cache survey conducted in 2012 documented 60 caches (USDA-Forest Service 2015b).

Objective 238a is being met based on the increase in beaver abundance and distribution from 2007 to 2012 (USDA-Forest Service 2015b). This is likely due to a combination of environmental and human-related factors, such as increased rainfall and stream flows and beaver transplants.

The Phase II Amendment FEIS (USDA-Forest Service 2005) determined that there would be adequate habitat for maintaining a viable population if standards are followed. Due to the

creation of more diverse habitats and vegetation treatments that may increase hardwoods (aspen) adjacent to riparian habitat, this project will likely contribute to Objective 238. Under either alternative, beaver are likely to persist on the Forest.

Direct and indirect impacts:
Alternative A
Proposed aspen enhancement near streams and wetlands would increase potential foraging habitat. Proposed activities would not result in a measurable increase in streamflow. Proposed activities would contribute toward achievement of objective 238a by maintaining or enhancing beaver habitat.

Alternative B
No direct impacts (mortalities) are anticipated. The No Action alternative would have no immediate effects on beavers. Foraging habitat may decrease over time.

Summary
Overall, alternative A would likely improve forest conditions more for the beaver. Beaver will persist under either alternative.

Black-backed woodpecker
The black-backed woodpecker is associated with montane coniferous forests, primarily in spruce and fir forests (Anderson 2003). They also inhabit ponderosa pine and lodgepole pine forests. These woodpeckers feed primarily on bark beetle larvae.

In the Black Hills, black-backed woodpeckers are highly associated with ponderosa pine forests that are recently burned (< 5 years) or have high bark beetle populations (Rota et al. 2014a, Rota et al. 2014b, Matseur 2017). Their home range in the Black Hills was estimated to be from 75 acres (Kistler and Fager 1981) to 500 acres (Rota et al. 2014a). Another essential habitat for this woodpecker is ponderosa pine forests that have dense, mature or late successional structure (i.e., structural stages 4C and 5). A study (Mohren et al. 2016) in the Black Hills, suggests black-backed woodpeckers are found in both immature (3C) and mature (4C, 5) ponderosa pine stands with high (>60%) canopy cover. This third habitat type is especially important when neither recently burned areas or high beetle populations are available. The population in the Black Hills is somewhat isolated from the rest of the North American population (Anderson 2003). The black-backed woodpecker population in the Black Hills was petitioned in 2012 for listing under the Endangered Species Act. On October 5, 2017, the U.S. Fish and Wildlife Service determined the bird did not warrant listing under the ESA.

Black-backed woodpecker densities peaked after the 2000 Jasper Fire during the second post-fire year when one bird/36 acres (or 6.9 birds/km^2) were observed (Panjabi 2003). Relative densities in burned habitat declined in the Jasper Fire as expected following a fire (Hutton et al. 2007). Forest-wide densities of black-backed woodpeckers have spiked upward in 2009 (White et al. 2010), probably due to MPB outbreaks. Matseur (2017) estimated approximately 1,460 and 1,720 pairs of black-backed woodpeckers, in the Black Hills in 2015 and 2016, respectively. This population estimate is more than 2 times as high as Mohren et al. (2014), (2000 data), which is likely a result of the high levels of disturbance the forest has experienced in the past 15 years.

As large wildfires age and MPB numbers return to endemic levels, preferred habitat will decline. Woodpecker numbers will also decline.

Current snag availability and distribution, largely the result of pine beetles, have short life spans and will typically fall within 5 to 7 years, contributing then, to down woody habitat. Currently adequate snags and large woody debris exist across most of the project area.

In the short-term (1-10 years) snag habitat for this species is currently provided, consistent with Objective 238b, Objective 221 and Objective 11.03. The "aging" of large burned areas, such as the Myrtle Fire, into habitat less suitable for black-backed woodpeckers is currently being offset by the acreage of insect-infested timber stands. However, insect availability has (and continues to) decline significantly. The beetle epidemic has ended, and reliance on dense, both immature (3C) and mature Ponderosa stands (4C and dense 5) will become a more important habitat feature. However, late-successional pine habitat has declined about 40% since 1997 (USDA-Forest Service 2015b). And time is needed for forest stands to develop into late-successional structural stage 5 (USDA-Forest Service 2015b).

Direct and indirect impacts:
Alternative A
Implementation of the Proposed Action could cause direct mortality and loss of potential habitat in the form of snags (hazard tree removal) and live, dense forest. In accordance with Forest Plan standards 2301 and 2305, snags would be retained unless they pose a hazard. The Proposed Action does not include post-fire salvage.

Proposed fuel break construction would decrease potential habitat in the form of dense, mature stands of live pine by up to 4,000 acres, but this impact would be reduced by coordination with wildlife biologists to retain the best habitat when possible. The Phase II Amendment FEIS determined that adequate habitat for maintaining viable populations would exist if standards and guidelines are followed and conditions move toward habitat objectives. Due to mountain pine beetle infestation and response actions, dense, mature pine forest is below the Forest Plan objective level in MA 5.1, and late succession pine forest is below objectives in all MAs that have objectives. No activities that may decrease late succession characteristics would occur in structural stage 5 stands (design features). Fuel breaks may occur in various management areas but would be focused on MA 5.4, which has a higher percentage of dense forest than other MAs. Close coordination with wildlife biologists would be required during layout and implementation to assess tradeoffs between potential habitat and fuel break location. The Proposed Action would conserve most of the suitable black-backed woodpecker habitat in live forest while increasing potential public and firefighter safety in key locations.

Proposed precommercial thinning, prescribed fire, and fuel treatments would reduce density of stands of small trees, facilitating growth of residual pine seedlings and saplings. Instead of stagnating, thinned stands would transition into mature forest within 20 to 40 years.

The Proposed Action would reduce the potential for large, stand-replacing wildfires, which create preferred black-backed woodpecker habitat. It may also decrease the potential scale of a future mountain pine beetle infestation. Under both alternatives, however, stand-replacing fires

and beetle infestations will continue to occur. The objective of the Proposed Action is to reduce the scale of these events and the severity of their effects, where possible. Subsequently, this alternative would maintain or permit some level of disturbance and heterogeneity within stands and at the landscape-level as identified by Matseur (2017) as needed to benefit the diverse needs of birds. It would conserve habitat for this species in accordance with Forest Plan objective 221 by minimizing the additional loss of dense, mature forest while trending toward the desired structural stage percentages in the long term.

Alternative B
Over time, the No Action alternative would allow development of additional closed-canopy forest. Increased difficulty of fire suppression and potential for high-severity fire could result in large, stand- replacing fires that would create black-backed woodpecker habitat.

Summary
Overall, alternative B would likely improve forest conditions more for the woodpecker. The black-backed woodpecker is expected to persist under either alternative.

Brown creeper
The brown creeper is selected as an MIS because of its association with old-growth ponderosa pine stands. Creepers prefer large, unfragmented, mature and old-growth stands with dense canopies and large live and dead trees (Hejl et al. 2002, Wiggins 2005a). Hejl et al. (2002) suggested that the most critical feature related to the selection of breeding areas is the presence of large trees and snags.

Breeding bird surveys in the BHNF have revealed that well over 90 percent of observations of brown creepers during the breeding season are in mature or old-growth forests, primarily spruce and late- successional ponderosa pine (Panjabi 2001, 2003, Giroir et al. 2007). Creepers are very sensitive to habitat fragmentation and changes in forest structure resulting from all forms of tree harvesting (Dykstra et al. 1999, Hutto 1995). Brown creepers generally prefer unburned forests (Hutto and Young 1999, Kotliar et al. 2002) but also use moderately burned forests. Matseur (2017) found the bird closely linked with white spruce and four- to five-year-old wildfire areas.

In 2005, data suggested that brown creepers were well distributed throughout the Black Hills (USDA Forest Service 2007a). Relative density decreased between 2013 and 2014, the most recent year for which data are available (USDA Forest Service 2015b). It is unknown whether this was a temporary drop or the beginning of a downward trend. Efforts to determine population trend are ongoing. Overall, the species appears to occur in very low densities, being most abundant in late successional pine forests and spruce habitats (Matseur 2017).

Direct and indirect impacts:
Alternative A
The Proposed Action would have the potential to cause loss of nesting and foraging habitat in ponderosa pine. Adherence to snag standards and the limited treatment of spruce (which is above the Forest Plan objective) would address this to some degree. The BHNF currently meets Forest Plan objective 211 regarding snag habitat. The Proposed Action would not reduce snag occurrence below Forest Plan objective 211 levels. Activities other than patch clearcuts would

retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Structural stage objectives for MAs 4.1, 5.1, 5.4, 5.43, and 5.6 were designed to ensure wildlife population viability and provide a balance of habitat conditions across the BHNF. Due to mountain pine beetle infestation, timber harvest, and wildfire, structural stages providing brown creeper habitat are currently below objectives. The objectives state that dense, mature pine should form a combined 10 percent of the pine forest area. In the five MAs combined, these structural stages currently form approximately six percent of the pine forest area. Most of this habitat is in the northern and eastern Black Hills and the Bear Lodge Mountains. Very little exists in the central Black Hills.

Potential nesting habitat may decrease by up to 4,000 acres due to proposed fuel break construction in dense stands. These treatments are focused in the WUI, along roads, and near infrastructure in areas typically less sustainable for dense nesting habitat. No activities that may decrease late succession characteristics would occur in late succession pine stands (design features). Fuel breaks may occur in various management areas but would be focused on MA 5.4, which has a higher percentage of dense, mature forest than other MAs. Close coordination with wildlife biologists would be required during layout and implementation to assess tradeoffs between potential habitat and fuel break location. While potential habitat may decrease, the above measures would decrease the likelihood of adverse effects on nests and maintain most existing, potential nesting habitat while increasing potential public and firefighter safety in key locations.

Alternative B
The No Action alternative would have no immediate effects. Over time, additional preferred habitat would develop. Increased difficulty of fire suppression and potential for high-severity fire could provide the recently burned habitat used by the species.

Summary
Overall, alternative B would likely improve forest conditions more for the brown creeper. Both alternatives would conserve habitat for this species in accordance with Forest Plan objective 238a.

Golden-crowned kinglet
In the Black Hills, golden-crowned kinglets are found primarily in white spruce forests (Panjabi 2003, Giroir et al. 2007, White et al. 2010) and this is the basis for its MIS selection. Panjabi (2003) also found them in small numbers in late-successional ponderosa pine (4B, 4C and 5), aspen, and wet meadows, although these areas likely had a spruce component. Golden-crowned kinglets on the Black Hills are likely limited by the abundance, distribution and condition of white spruce habitat.

Golden-crowned kinglet habitat (white spruce) appears relatively stable or slowly increasing on the Forest (USDA-Forest Service 2015b). Relative to ponderosa pine, 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. Spruce habitat is found on 24,289 acres

on the Forest which exceeds Objective 239-LVD of 20,000 acres. This project proposes activities that may reduce spruce and late successional pine habitat across the project area decreasing habitat for this bird. The Forest is meeting Objective 238a based on the acres of preferred habitat. However, relative density across the Forest has declined considerably since 2009 (RMBO Avian database). This has coincided with the reduction of late successional pine habitat available across the BHNF. Continued efforts to conserve spruce and late successional pine habitats is needed to conserve habitat for this species (USDA-Forest Service 2015b). This project has the potential to move away from Objectives 238a and 239 if more than 4,000 acres of spruce is removed. Proposed activities in dense, late successional pine move Forest away from Objective 238.

Direct and indirect impacts:

Alternative A

Proposed prescribed fire, shaded fuel breaks, and removal of conifers from aspen may result in incidental decreases in spruce habitat, though these activities would be unlikely to occur in spruce- dominated stands. The project would contribute toward achievement of Forest Plan objective 238c by conserving spruce habitat.

Alternative B

The No Action alternative would have no immediate effects. Preferred habitat may increase over time.

Summary

Overall, alternative B would likely improve forest conditions more for the kinglet. The golden-crowned kinglet is expected to persist under either alternative.

Grasshopper sparrow

The grasshopper sparrow is selected as an MIS because this bird is likely a good indicator of prairie grassland habitat condition. The grasshopper sparrow breeds from southern Canada south through the majority of the United States including northwest portions of Washington, Oregon and California (Slater 2004). It does not breed in the arid southwest. This species winters in southern United States and Mexico (Sibley 2003). In Wyoming, it breeds mainly in the eastern portion of the state, and occurs almost statewide except in the south central portion (Orabona et al. 2009). In South Dakota, there are breeding records throughout the state, including the Black Hills and this species is considered a locally common migrant and summer resident (Tallman et al. 2002).

Grasshopper sparrows have been monitored on the Black Hills since 2002 in cooperation with the Rocky Mountain Bird Observatory (Panjabi 2003, 2005). It occurs widely in native mixed-grass prairies in the southern Black Hills, and locally further north in the central Black Hills (Panjabi 2005, USDA-Forest Service 2005). Panjabi (2005) found them in the highest density in mixed-grass prairie habitat. They may also occur in other types of grasslands (Panjabi 2003). With active management (Alternative A) grassland habitat will be maintained and likely increase across the Forest. Grasshopper sparrow numbers will likely remain stable and may increase slightly as well.

Current grassland acreage across the project area exceeds the objective by approximately 33,785 acres so the Forest is conserving meadow habitat (Objective 238a). Efforts to reduce pine

regeneration and encroachment into grassland and meadow habitats will be continually needed to enhance and maintain grassland habitat (USDA-Forest Service 2015b). This project is consistent with Objective 238.

Direct and indirect impacts:
Alternative A
The Proposed Action may result in direct mortality. Proposed removal of encroaching pine from grasslands and prescribed fire would maintain treated grassland habitats in the project area. The project would contribute toward achievement of objective 221 by maintaining or enhancing grasshopper sparrow habitat.

Alternative B
The No Action alternative would have no immediate effects. Preferred habitat may decrease over time due to pine encroachment.

Summary
Overall, alternative A would likely improve forest conditions more for the grasshopper sparrow. The sparrow is expected to persist under either alternative.

Ruffed grouse
Ruffed grouse are selected as MIS due to their strong association with aspen. They are more abundant in the northern Black Hills then the rest of the forest probably due to the increased presence of aspen and hardwood stands in general. All of the aspen structural stages provide this grouse with certain life history requirements, but sapling-pole structural stages are considered optimal (Wiggins 2006). Early aspen stands provide broods with cover and display sites for breeding males. Although they do eat buds and fruits of other plants, research has shown that populations decline when aspen is removed even if alternative food sources are plentiful. Some authors have indicated that conifers in close proximity to aspen stands are desirable for winter cover (DeGraaf et al., 1991). Ruffed grouse are fairly sedentary and tend to spend their entire lives within 1 mile of the natal nest site.

Mehls et al. (2014) assessed habitat use of male ruffed grouse to identify the most appropriate scale to manage for aspen and ruffed grouse in the Black Hills. Aspen with >70% overstory canopy cover was important to the occurrence of ruffed grouse, but was most influential within one-mile of drumming sites. Ruffed grouse also selected for areas with many small, regular shaped patches of aspen over those with few large patches. Ruffed grouse selected drumming logs in close proximity to high stem densities of aspen with a minimal presence of roads. Ponderosa pine had a negative influence on site selection at the 125- 400-m (~50 ha), 1600-m (~804 ha), and 4800-m (~7200 ha) scales. They recommended management efforts should incorporate multiple age and size classes of aspen with an emphasis on enhancing early successional habitat to provide valuable cover through increased stem densities.

The Phase II Amendment FEIS (USDA-Forest Service 2005) determined that there would be adequate habitat for maintaining a viable population of ruffed grouse if standards and guidelines are followed at the project level, and if conditions move towards aspen and hardwood objectives. The long-term habitat and population trend for grouse suggest declining aspen habitat and grouse

numbers (USDA-Forest Service 2015b). In Wyoming, hunter participation and harvest levels suggest grouse populations have been generally stable the last seven years (WGFD 2017). Impacts from this project are expected to increase preferred habitat and perhaps grouse numbers Forest wide. The ruffed grouse would likely persist under either alternative and the BHRL project is consistent with Objective 238.

Direct and indirect impacts:
Alternative A
Proposed activities would maintain and increase aspen habitat. This would be a beneficial effect in relation to implementing the management recommendations identified by Mehls et al. (2014). The Proposed Action would contribute toward achievement of Forest Plan objective 238a by conserving and enhancing ruffed grouse habitat.

Alternative B
The No Action alternative would have no immediate effects. Preferred habitat may decrease over time unless it is regenerated by wildfire or other natural disturbance events.

Summary
Overall, alternative A would likely improve forest conditions more for the ruffed grouse. Ruffed grouse are expected to persist under either alternative.

Song sparrow
In the Black Hills, the song sparrow is strongly associated with riparian habitats (Giroir et al. 2007). They occur predominantly in and are dependent upon willows and streamside thickets (Giroir et al. 2007). Song sparrows are selected as MIS because of their dependence on these riparian areas. Throughout the breeding range, females build and incubate open-cup nests in grasses and shrubs near fresh water, at forest margins wherever suitable cover and insect food are present. Primary forage includes seeds, fruits, and invertebrates as available. They are uncommon winter residents in the Black Hills, many likely spending the winter on adjacent prairie habitat (Tallman et al. 2002).

Song sparrows are found throughout the Black Hills, but are more common in the northern Hills. Forest wide habitat trends are not known at this time because BHNF data on riparian condition is not collected (USDA-Forest Service 2015b). Breeding Bird Survey data showed sparrow populations were stable to slightly increasing in the Black Hills (Sauer et al. 2011). Population estimates ranged from approximately 8,000 to 14,000 birds associated with riparian habitat (USDA-Forest Service 2005). However, sparrow densities decreased from 2012 to 2014 (USDA-Forest Service 2015b). Impacts from this project may have short-term (1 to 5 year) negative impacts but longer riparian habitat improvement (3-25 years) and a negligible impact on sparrow numbers. Negligible impacts to Forest wide habitat or sparrow numbers are anticipated. This project is consistent with Objective 238 with projected long-term benefits to riparian habitat. The song sparrow is expected to persist under either alternative.

Direct and indirect impacts:
Alternative A
Proposed activities would result in no more than minor, temporary increases in streamflow. Adherence to Forest Plan standards (1301, etc.) as well as Watershed Conservation Practices (WCPs) and Best Management Practices (BMPs) would prevent substantial or widespread adverse effects on riparian habitat. The Proposed Action would contribute toward achievement of Forest Plan objective 238a by conserving song sparrow habitat.

Alternative B
The No Action alternative would have no immediate effects. Preferred habitat is likely to remain stable over time.

Summary
Overall, alternative A would likely improve forest conditions more for the sparrow. The song sparrow will likely persist under either alternative.

Mountain sucker
The mountain sucker occurs most often in cool, clear mountain streams with moderate water velocities. Stream substrate associated with mountain sucker habitat varies widely and ranges from mud to sand, gravel, and boulders, although cobbles are most common. This species is found on the stream bottom and is closely associated with cover (exposed roots, undercut banks, logjams, and boulders). Mountain suckers are bottom feeders and their diet is primarily simple plants like diatoms and green algae. Mountain sucker adults spawn over gravel riffles and use lower velocity, deeper habitats during non-breeding periods and young-of-year mountain sucker require shallow low velocity habitats (Belica and Nibbelink 2006).

Mountain suckers are native to the Black Hills and comprise the eastern-most extent of the species. Belica and Nibbelink (2006), Isaak et al. (2003) and Schultz (2011) assessed the status of the mountain sucker in the Rocky Mountain Region and the Black Hills. Schultz (2011) studied the environmental factors affecting long-term trends in mountain sucker populations and their thermal tolerance on the South Dakota portion of the Black Hills. Factors negatively affecting mountain sucker populations included non-native trout, recurrent droughts and stream fragmentation. Overall, results of this study indicate that the mountain sucker is currently not limited by water temperature in the Black Hills, but some areas that are currently suitable for mountain sucker may be lost due to climate change (Hirtzel 2012). Fisheries surveys indicate that the population trend for mountain sucker has declined since the 1960s (Schultz 2011).

Direct and indirect impacts:
Alternative A
Potential direct effects of the Proposed Action relate to in-water actions, such as culvert installation or repair at road-stream crossings that may kill or injure mountain suckers. Adult mountain sucker usually swim away to avoid harm, but eggs or very young fish are more vulnerable. These impacts would be largely avoided through design features to minimize in-water construction activities during the mountain sucker spawning season. No new road-stream crossings are proposed on streams where mountain sucker are known to occur, but some existing crossings may need to be improved in occupied habitat. The reconstruction of existing road-

stream crossings may have the indirect benefit of improving fish passage and stream connectivity if the existing culvert being replaced is a barrier to fish passage. Other indirect effects generally relate to ground-disturbing activities with potential to add sediment to the stream network, impact streambank stability, or degrade riparian habitat. Increased sediment delivery to streams, whatever the source, tends to result in less diverse physical habitats, decrease water quality, denude spawning substrates, and decrease availability of deep pools (Isaak et al. 2003). These impacts would be mitigated through the implementation of Forest Plan standards and guidelines, WCPs, and other design features that ensure non-point source water pollution is controlled at levels that maintain water quality standards and fisheries beneficial uses. Some beneficial changes would occur; a more resilient landscape would be likely to reduce the potential for watershed-scale adverse effects on aquatic habitat due to high- severity wildfire, though it should be noted that mountain suckers have persisted over time in the Black Hills despite its disturbance ecology.

Alternative B

The No Action alternative would not result in direct effects. Indirect effects may include increases in tree biomass. This may increase tree evapotranspiration but the effect would probably be overshadowed by precipitation patterns. Therefore, no discernable effect on flow regimes or mountain sucker habitat would occur. Fire hazard and risk of mountain pine beetle infestation may increase over time. Some sediment input may occur from natural erosion processes and other activities but effects on aquatic habitats would be minimal.

Summary

Overall, Alternative A proposes more ground-disturbing activities on more acres than Alternative B, but both alternatives implement the same Forest Plan standards/guidelines, watershed conservation practices and design criteria to ensure water quality standards are met and fisheries beneficial uses are maintained. Under both alternatives, habitat quality, quantity and connectivity are likely to be maintained at the Forest-level consistent with Objective 238d. Therefore, the mountain sucker will likely persist under either alternative.

Species of Local Concern (SOLC)

Species of Local Concern (SOLC) are plant, fish and wildlife species (including subspecies or varieties) that do not meet the criteria for sensitive status. These could include species with declining trends in only a portion of Region 2, or those that are important components of diversity in a local area. The local area is defined as NFS lands within the BHNF. All SOLC species on the Forest occur in the project area or habitat occurs in the project area and are carried forward and analyzed in this document. Potential impacts of either alternative are presented.

Table 1. Habitat descriptions for Black Hills National Forest Species of Local Concern occurring within the project area.

Species of Local Concern	Habitat
Birds	
American Dipper (*Cinclus mexicanus)*	Swift-flowing montane streams; occur primarily in Spearfish Creek and its tributaries and Whitewood Creek in the Black Hills (Anderson 2002).
Black-and-White Warbler *(Mniotilta varia)*	Found primarily in bur oak woodlands and associated edges, mainly at lower elevations (Hutton et al. 2007).

Broad-winged Hawk *(Buteo platypterus)*	Primarily found in habitat with prominent deciduous component, but also found in late successional pine stands (Stephens and Anderson 2003).
Cooper's Hawk *(Accipiter cooperii)*	Ponderosa pine, white spruce, riparian, shrubland and burned areas (Stephens and Anderson 2002).
Northern Saw-whet Owl *(Aegolius acadicus)*	Forest habitat generalist; dense coniferous or mixed forest; prefers conifer stands and willow thickets for roosting; hunt along edges or openings in forest (Johnson and Anderson 2003).
Pygmy Nuthatch (*Sitta pygmaea*)	Mature ponderosa pine stands with large trees and snags (Ghalambor 2003).
Sharp-shinned Hawk (*Accipiter striatus)*	A variety of forested areas, but nesting habitat typically restricted to dense young conifer stands (Stephens and Anderson 2002).
Mammals	
Long-eared Myotis *(Myotis evotis)*	Mostly coniferous montane habitats; roosts in snags; no known hibernacula in Black Hills (Schmidt 2003a).
Long-legged Myotis (*Myotis volans)*	Primarily in montane coniferous forests; uses caves and mines as hibernacula; roosts in abandoned buildings, rock crevices, under bark; in Black Hills occur primarily between 4500 and 6500' (Schmidt 2003b).
Meadow Jumping Mouse *(Zapus hudsonius campestris)*	Strongly associated with riparian habitats along small streams in meadows (Orabona et al. 2009).
Mountain Goat (*Oreamnos americanus)*	Rugged terrain with cliffs, rock faces, ledges and talus slopes. Limited primarily to Black Elk Wilderness Area and Norbeck Wildlife Preserve (USDA-Forest Service 2005).
Northern Flying Squirrel *(Glaucomys sabrinus)*	Preferred habitat is closed canopy, mature ponderosa pine forest with fewer snags, though snags and cavities in live deciduous trees are important for denning (Hough 2008, Hough and Dieter 2009).
Northern Myotis (*Myotis septentrionalis)*	Dense ponderosa pine and mixed coniferous/deciduous forest; roosts in caves, mines, tunnels, and under bark of snags; elevation ranges between 4000 to 6500' in the Black Hills (Schmidt 2003c).
Small-footed Myotis (*Myotis ciliolabrum)*	Variable habitats, but usually associated with rocky areas like bluffs, dissected breaks, ridges, cliffs and major rock outcrops; Roosts include mines, caves, rock features, and under bark (Schmidt 2003d).
Invertebrates	
Atlantis Fritillary Butterfly *(Speyeria Atlantis pahasapa)*	Prefer wet meadows and boggy areas near springs and headwaters of small streams (Marrone 2002).
Tawny Crescent Butterfly *(Phyciodes batesii)*	Open meadows and riparian woodlands (Stefanich 2001).
Callused Vertigo Snail (*Vertigo arthuri*)	Moist, relatively undisturbed forest with diverse understories, deep litter, and abundant woody material. Calcareous or shist soils. (Frest and Johannes 2002, Anderson 2004a)
Frigid Ambersnail (*Catinella gelida*)	Limestone soils, usually in open ponderosa pine forest (sometimes spruce), often with a secondary deciduous tree and shrub component (Frest and Johannes 2002).
Mystery Vertigo Snail (*Vertigo paradoxa)*	On limestone or schist soils, usually in spruce forests (but sometimes pine) with relatively closed canopy, abundant litter, and well-developed understories (Frest and Johannes 2002, Anderson 2004b).

Striate Disc Snail (*Discus shimekii)*	Found in litter of rich mesic forests with limestone soils, generally on shaded, north-facing slope bases; often bordering or ranging slightly onto stream flood plains (Frest and Johannes 2002).

American dipper

Alternative A

The Proposed Action would conserve habitat for dippers in accordance with Forest Plan objective 221 through fuel reduction treatments that would reduce fire hazard in watersheds with known or potential dipper habitat. Proposed activities would result in no more than minor, temporary increases in streamflow. Adherence to Forest Plan standards (1113, 1203, 1301, etc.), WCPs, and BMPs focused on protection of streams and riparian areas would prevent substantial or widespread adverse effects on dipper habitat.

Alternative B

The No Action alternative would have no effect on dippers.

Summary

Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving dipper habitat. This species is expected to continue to persist in the BHNF under either alternative.

Black-and-white warbler

Alternative A

The Proposed Action could result in direct mortality. Proposed activities would increase open, diverse, and resilient forests. Enhancement of oak woodlands by removing pine may benefit warblers. At lower elevations in and near oak woodlands, these effects would conserve and improve habitat for this species (Forest Plan objective 221).

Alternative B

The No Action alternative would have no immediate effects. Eventually, lack of action could result in loss of some suitable habitat due to pine encroachment. Should a high intensity fire occur, oak is a prolific sprouter, and would rapidly increase and expand in the absence of pine competition to the benefit of warblers.

Summary

This species would persist under either alternative.

Broad-winged hawk and Cooper's hawk

Alternative A

The Proposed Action may result in direct mortality if unknown nests are affected by proposed activities. Adherence to Forest Plan standard 3204 (protection of known raptor nests) would prevent negative effects on known nests. Proposed fuel breaks in dense, mature pine stands could reduce potential nesting habitat. Generally, these treatments would occur in the WUI, along roads, and near infrastructure, which is not the most sustainable nesting locations for these species. Site-specific coordination with a wildlife biologist to design treatments would help to avoid/minimize the loss of nesting habitat. Proposed aspen treatments may improve foraging

habitat and, for broad-winged hawk, nesting habitat. New roads could result in disturbance of unknown nests.

Due to mountain pine beetle infestation and response actions, moderately dense, mature pine forest is currently below Forest Plan objectives in most management areas. In addition, dense, mature pine forest is below the objective in MA 5.1, and late succession forest is below objectives in all MAs that have objectives. No activities that may decrease late succession characteristics would occur in late succession stands (design features). Fuel breaks may occur in various management areas but would be focused on MA 5.4, which has a higher percentage of dense forest than other MAs. Because proposed activities would protect known nests, conserve most potential nesting habitat, and enhance foraging habitat, the Proposed Action would contribute toward achievement of objective 221 for these hawks.

Alternative B
The No Action alternative would not affect these species or their habitat.

Summary
Broad-winged and Cooper's hawks would persist on the BHNF under either alternative.

Northern saw-whet owl
Alternative A
The Proposed Action may result in direct mortality or disturbance if unknown nests are affected by proposed activities. Adherence to Forest Plan standard 3204 would protect known nests. Proposed fuel breaks in dense, mature pine stands could reduce potential nesting habitat. Overstory removal would move open, mature pine stands to younger stages, conserving habitat diversity (USDA Forest Service 2015b). Precommercial thinning and prescribed fire would decrease density in young pine stands, which this owl uses for roosting. Foraging habitat, which consists of diverse, open stands and forest edges, would increase.

The potential effects on dense, mature pine forest habitat described above for the broad-winged hawk and Cooper's hawk, may be similar for the saw-whet owl, though this species nests in a variety of habitats (Johnson and Anderson 2003). The Proposed Action would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcut would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Because proposed activities would protect known nests, conserve most potential nesting habitat, and enhance foraging habitat, the Proposed Action would contribute toward achievement of objective 221 for the saw-whet owl.

Alternative B
The No Action alternative would have no immediate effects. Over time, roosting and foraging habitat could decrease as pine stands age and become denser.

Summary
This species would persist in the BHNF under either alternative.

Pygmy nuthatch

Alternative A

The Proposed Action may result in direct mortality or disturbance if unknown nests or roosts are affected by proposed activities. The Proposed Action would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain some live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest. Preferred mature pine habitat would also decrease, though not to the extent of becoming a limiting factor.

Because proposed activities would conserve most snags and foraging habitat, the Proposed Action would contribute toward achievement of objective 221 for the pygmy nuthatch.

Alternative B

The No Action alternative would have no effect.

Summary

This species would persist in the BHNF under either alternative.

Sharp-shinned hawk

Alternative A

The Proposed Action may result in direct mortality or disturbance if unknown nests are affected by proposed activities. Adherence to Forest Plan standard 3204 would protect known nests. Proposed overstory removal would increase preferred nesting habitat (dense to moderately dense, young pine forest), as would regeneration of previously infested and thinned stands. At the same time, proposed precommercial thinning and prescribed fire would reduce density in some of the same stands.

Projections indicate that preferred forest structures would increase over the next 20 years. Foraging habitat would remain stable, with management activities providing a variety of structural stages and cover types used by diverse prey species. The project would contribute toward achievement of Forest Plan objective 221 by conserving and enhancing sharp-shinned hawk habitat.

Because proposed activities would protect known nests and conserve potential nesting and foraging habitat, the Proposed Action would contribute toward achievement of objective 221 for the sharp- shinned hawk.

Alternative B

The No Action alternative would have no immediate effect. Over time, nesting habitat could decrease as young pine stands age.

Summary

This species would persist in the BHNF under either alternative.

Bats: Long eared myotis, Long-legged myotis, Northern myotis and Small-footed myotis

Alternative A

The Proposed Action could result in direct mortality due to tree and snag (hazard tree) felling. Activities conducted when maternity roosts consist of females with pups that cannot yet fly pose the greatest mortality risk to bats. Potential loss of occupied daytime roost trees may negatively impact individuals. The Proposed Action would reduce the number of large trees in open, mature pine stands and snags (hazard tree removal) while increasing open forests. Proposed activities would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Maintenance of aspen and oak would perpetuate foraging habitat. Insect prey populations may increase with understory vegetation in treated areas. Adherence to Forest Plan standards 1401 and 3207 would protect known and potential nurseries and hibernacula in accordance with standard 3102. The project would contribute toward achievement of Forest Plan objective 221 by conserving and enhancing habitat for these bat species.

Alternative B

The No Action alternative would have no direct or immediate indirect effects. Over time, formation of additional snags may increase roosting habitat.

Summary

These bats are likely to persist in the BHNF under both alternatives due to protection of caves and mines as well as the availability of foraging habitat and expected snag densities.

Meadow Jumping Mouse

Alternative A

The Proposed Action may result in direct or indirect mortality. This effect would not occur at a scale that could result in population decline across the BHNF. Adherence to Forest Plan standards 1301, 1302, and 3106 (protection and avoidance of riparian areas), in addition to WCPs and BMPs, would conserve habitat in accordance with objectives 213 and 221. Proposed mechanical site preparation and tree planting would decrease moderately suitable jumping mouse habitat (dry upland areas dominated by grass) in the southern portion of the project area.

Alternative B

The No Action alternative would have no immediate effects. Preferred meadow and grassland habitat would decrease over time due to pine encroachment.

Summary

This species is likely to persist in the BHNF under both alternatives due to protection of riparian and meadow habitats.

Mountain Goat

Alternative A

The Proposed Action would increase preferred open forest conditions. If this effect occurs near cliffs that serve as escape terrain, it may result in improved foraging habitat for mountain goats.

No activities are proposed in Norbeck Wildlife Preserve, where the majority of the goat population occurs. The project would contribute toward achievement of Forest Plan objective 221 by conserving mountain goat habitat.

Alternative B
The No Action alternative would have no immediate effects. Preferred open habitats may decrease over time as pine regenerates.

Summary
Mountain goats are expected to persist on the Forest under either alternative.

Northern Flying Squirrel
Alternative A
The Proposed Action may result in direct mortality and could displace flying squirrels. These effects would not occur at a scale that could result in population declines across the BHNF. Diversity in pine habitats would increase in treated areas. Proposed activities may remove roost trees and snags (hazard trees) and decrease occurrence of large, live trees that could provide future snags. Proposed activities would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Dense, mature pine forest may decrease by up to 4,000 acres in shaded fuel breaks, primarily along roads, the WUI and other infrastructure. Site-specific coordination with a wildlife biologist may retain some of this habitat where it would not compromise the effectiveness of the treatment. Any decrease in 4C in MA 5.1 would move conditions further from Forest Plan objective 5.1-204. Because activities in dense, mature forest are to be focused away from this management area, any decrease is expected to be minor. Overall, this alternative would attempt to maintain or increase preferred pine habitat (structural stages 3c, 4b and 4c) that Hough and Dieter (2009) found to be optimal habitat for protection from aerial predators and for moving efficiently and safely during nighttime activity.

Alternative B
The No Action alternative would have no immediate effects. Preferred dense forest and snag habitats may increase over time. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving northern flying squirrel habitat.

Summary
Because flying squirrels can exist in a variety of habitats, they would persist under either alternative.

Butterflies: Atlantis fritillary and Tawny crescent
Alternative A
The Proposed Action may result in direct mortality of adults and larvae, particularly in meadow and riparian areas. Most activities would maintain or enhance preferred open forests, aspen and oak habitats, and grasslands in accordance with objective 221. Mechanical site preparation and

tree planting in the southern Hills would decrease open areas. The project would contribute toward achievement of Forest Plan objective 221 by conserving Atlantis fritillary and tawny crescent habitat.

Alternative B
The No Action alternative would have no immediate effects. Preferred habitats may decline over time.

Summary
The Atlantis fritillary and tawny crescent would persist in the BHNF under either alternative.

Snails: Callused Vertigo, Frigid Ambersnail, Mystery Vertigo, Striate Disc

Alternative A
The Proposed Action may cause direct mortality and change microclimates, damaging or destroying unknown snail colonies. Management of known colonies consistent with Forest Plan standard 3103 would protect microsite conditions and minimize adverse effects on these colonies. The project would generally contribute toward achievement of Forest Plan objective 221 by conserving snail habitat.

Alternative B
The No Action alternative would have no immediate effects. Fire hazard may increase over time; high-severity wildfire could threaten snail colonies.

Summary
These snail species would persist in the BHNF under either alternative.

Rocky Mountain Elk
Elk are not a designated special status species for the BHNF but strong public interest and questions on forest management effects to elk suggest potential impacts of the BHRL project should be disclosed. Recent estimates place the population level at about 7,200 elk in the South Dakota Black Hills, based on a 2016 aerial survey (SDGFP 2016). The SDGFP Elk Management Plan (2015-2019) outlines a Black Hills population objective (excluding Custer State Park and Wind Cave National Park) at 7,000 wintering elk, with a range of 6,000 to 8,000 elk depending on habitat conditions. The same 2016 aerial elk survey estimated a population of 1,100 elk for the Wyoming portion of the Black Hills. Anecdotally, the Wyoming Black Hills elk population was estimated at about 2,700 animals at the end of the 2016 hunting season, although only about half that number occupy national forest lands at any point in the year (WGFD 2017).

Elk use a wide variety of vegetation types on the Forest but show a preference for forested riparian areas, forested stringers in meadows, and deciduous stands of birch or aspen (SAIC 2003). Elk find cover (thermal or hiding or both) on the Forest in the denser stands of conifers (summer and winter) and hardwoods (summer only). For forage, however, they rely on more open stands and meadows and prairies, all of which may provide an abundance of grasses, forbs, and/or shrubs (SAIC 2003).

Roads negatively impact elk in various ways. The loss of habitat to road construction is unknown, but is often estimated at 5 acres per linear mile (Rowland et al. 2004). Roads may impact habitat by reducing the amount of patches of forest cover large enough to function effectively as elk habitat (Rowland et al. 2004). Roads may also impact elk habitat by facilitating the spread of invasive, exotic vegetation (Rowland et al. 2004). Roads and motorized trails can also impact animals directly. In addition to mortality from collisions with vehicles, elk avoid areas near open roads, are more vulnerable to hunter harvest, and exhibit higher stress levels in areas or higher road density (Rowland et al. 2004). Several studies in the Black Hills have shown elk are adversely impacted by roads (Millspaugh et al. 2000, Millspaugh 1999, Rumble et al. 2005). Rumble et al. (2005) found that elk movements increased with increased human activity during the hunting season. They suggested this response to hunters may reflect a pattern of elk responses to human disturbance during other times of the year.

Direct and Indirect Effects

Alternative A

The Proposed Action may result in direct mortality and displacement. Calves would be most vulnerable from approximately May to July. Proposed activities would also create more diverse and open conditions suitable for foraging. Dense forest would decrease while aspen may expand. Aspen enhancement would maintain or increase preferred calving habitat.

Suitability of elk habitat would decline in the vicinity of roads temporarily opened during implementation of the Proposed Action. This decline would persist as long as the roads are open to motorized vehicles.

Elk population response to habitat changes depends on the arrangement of cover and forage. Elk may not use potential foraging areas if lack of cover increases susceptibility to predation or disturbance.

The arrangement of cover and forage resulting from this project would depend on the exact locations of proposed activities, which would be determined in an interdisciplinary setting. Adherence to guideline 3203 would provide big game screening along at least 20 percent of the edges of arterial and collector roads.

Alternative B

The No Action alternative would have no immediate effects. Security and thermal cover may increase over time while foraging areas decrease.

Summary

Elk would be likely to persist in the BHNF under either alternative.

Migratory Birds

The USFWS Birds of Conservation Concern (BCC) (U.S. Fish and Wildlife Service 2008) partitions North America into 37 Bird Conservation Regions. The Black Hills is included in BCR 17 – Badlands and Prairies. Of the 38 bird species found in BCR 17 (U.S. Fish and Wildlife Service 2008), twenty species are not expected to occur in the Black Hills due to lack of habitat. Eleven are on the Region 2 Sensitive species list and are evaluated above if they have potential to occur in the Black Hills. Of the remaining species, four may occur in the project area; the golden eagle, red-headed woodpecker, black-billed cuckoo and prairie falcon.

Golden Eagle
This eagle inhabits open country, from barren areas to open coniferous forests, primarily in hilly or mountainous regions, but is also found in deserts and grasslands. It prefers to nest on cliff ledges, but will occasionally use trees for nesting. The golden eagle utilizes hilltops, cliff ledges and trees for roosting (DeGraff et al. 1991). Within the Black Hills, this eagle prefers to nest on sandstone and limestone cliffs. Contiguously forested habitats, such as those found within the project area are not preferred by golden eagles, but they may be used for roosting or perching if suitable nesting or foraging habitat is nearby. Forest Plan direction provides direction to protect known golden eagle nests (Forest Plan Standard 3204).

The Proposed Action could disturb nesting birds. Hunting success may increase due to the creation of more open habitat. Reduction of pine overstory in treated areas would improve habitat for many eagle prey species. Proposed commercial timber harvest would reduce the number of potential nest trees, but trees large enough to be used for nesting are not a limiting factor. The No Action alternative would have no impact on the eagle. Golden eagles would persist under either alternative.

Red-headed Woodpecker
Red-headed Woodpecker prefers open, park-like woodlands, including open ponderosa pine, but is most prevalent along riparian areas within forested areas. They use more open and edge forest habitats than some other woodpeckers, but are still dependent on snags and decaying trees (Anderson 2003). In the Black Hills, they are generally uncommon to rare. Currently they occur in very low densities across the Forest except in burn areas where they were found in higher densities in 2009 (White et al. 2010). They are a generalist species feeding on mast, a wide variety of berries, as well as insects and other birds' young and they often appear in areas with insect outbreaks (Anderson 2003).

The Proposed Action would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Proposed activities would maintain or expand existing aspen and oak habitats. Though use of the project area by red-headed woodpeckers is rare, these effects may benefit the species through increased mast production and decreased forest density (Anderson 2003). Activities proposed in burned habitat, such as tree planting, are not expected to negatively affect this species.

The No Action alternative would have little effect on this species. Potential habitat may eventually decrease if forest becomes denser and encroaches on openings. Red-headed woodpecker would persist under either alternative.

Black-billed Cuckoo
This species favors areas of upland woods that provide a variety of trees, bushes and vines. Also occurs in brushy pastures, hedgerows, open woodlands, thickets, and along wooded roadsides. Preferred habitat includes low, dense, shrubby vegetation (DeGraff et al. 1991). They will also inhabit open woods, avoiding extremely dense woods and high elevations (Haldeman 1980).

The Proposed Action may disturb nesting birds. Reduction of pine canopy cover may result in an increase in understory vegetation productivity, which may enhance potentially potential habitat. Suitable habitat would remain under either alternative. The No Action alternative may eventually allow pine overstory to increase, decreasing potential cuckoo habitat. This species is likely to persist under either alternative.

Prairie falcon

Prairie falcons are year-round residents of Wyoming and far western South Dakota. They nest on cliffs (Tallman et al. 2002, DeGraff et al. 1991). Hunting occurs in open areas. Observations in the Black Hills are primarily along the outer edges where cliffs provide nest sites adjacent to open grasslands (Panjabi 2003).

The Proposed Action would maintain or expand open habitats. Though prairie falcons are rare or absent in most of the project area, this effect may enhance habitat where it occurs near the edge of the Black Hills. The No Action alternative would have little effect on this species. Potential habitat may eventually decrease if forest continues to encroach on openings. Prairie falcons would persist under either alternative.

Recreational Fisheries

Executive Orders 12962 and 13474 regarding Recreational Fisheries direct federal agencies to conserve, restore and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide and to ensure that recreational fishing is managed as a sustainable activity. Under both Alternatives, a design criteria to avoid inwater work during the trout spawning season applies to avoid/minimize direct effects. Aquatic habitat and the food base, such as aquatic macroinvertebrates, would be conserved through the implementation of Forest Plan standards/guidelines, watershed conservation practices and design criteria which address sediment issues from non-point sources, thereby providing for sustainable recreational fishing opportunities. Additional water resource-related information and analysis can be found in the Watershed Report in the Project Record.

Biological Evaluation for Threatened, Endangered and Sensitive Species

The purpose of this biological evaluation is to analyze and determine the likely impacts of the alternatives on federally listed species (endangered, threatened, and proposed) and Forest Service sensitive species (FSM 2670.31-2670.32). This Biological Evaluation (BE) conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

Forest Service policy requires that a review of programs and activities, through a biological evaluation (BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and sensitive species (FSM 2670.3). Under the ESA, a Biological Assessment (BA) must be prepared for federal actions that are “major construction activities” to evaluate the potential effects of the proposal on listed or proposed species. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of

the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that TEPS species receive full consideration in the decision-making process.

Biological Evaluation Process

A pre-field review was conducted to assemble occurrence records and describe habitat needs and ecological requirements for each species. Sources of information included BHNF wildlife biologists, Forest Service records and files, databases and published research (citations). This information constitutes the best available science for determining the impacts of the alternatives on Region 2 sensitive species. Field reconnaissance has continued to be gathered during work on other projects and Forest-wide monitoring efforts. In addition, publications based on field work conducted by other parties in the Black Hills and elsewhere were also used as appropriate.

The intensity and detail of the biological evaluation may vary and should be commensurate with the risk associated with the action and the vulnerability of the species involved (FSM R-2 Supplement 2600-2017-1). The analysis of potential impacts on sensitive species was conducted using existing data and the habitat requirements for each species. The overall conclusions were derived from anticipated trends, probable risks, and degree of uncertainty under either alternative. The determination language is set forth in Region 2 Supplement 2600-2011-1 to the Forest Service Manual 2670.

The basis for each determination is potential habitat, expected occurrence, distribution, impacts from Forest activities, and proposed design features used to alleviate the potential impacts resulting from Forest-management activities. Species viability was evaluated in the Phase II Forest Plan Amendment Biological Evaluation (USDA-Forest Service 2005).

Threatened and Endangered Species

Threatened, endangered, and proposed species (U.S. Fish and Wildlife Service 2018) located on the BHNF and occurring in the project area potentially affected by this project are the black-footed ferret and northern long-eared bat (NLEB).

Black-footed Ferret

The black-footed ferret is a nocturnal, solitary carnivore of the weasel family with the narrowest range of ecological tolerance of any North American predatory mammal (USDA Forest Service 1996). In the Black Hills, as elsewhere, the key habitat component for black-footed ferrets is the distribution and abundance of prairie dogs (Forrest et al. 1985). Vacated prairie dog burrows provide shelter and are where ferrets spend most of their time.

There are 11 prairie dog towns in the BHNF, covering about 225 acres (USDA Forest Service 2015b). Black-footed ferrets were recently released as part of an experimental population in Wind Cave National Park, adjacent to the southeastern part of the project area. There are no prairie dog towns in the BHNF large enough to independently support ferrets nor are there any prairie dog towns in the BHNF adjacent to Wind Cave National Park. There is no designated critical habitat for black-footed ferrets in the BHNF.

Determination: Either alternative is expected to have no effect on black-footed ferrets because the ferret or suitable habitat does not occur in the project area.

Northern long-eared bat

Northern long-eared bats are forest-dwelling and insectivorous. They hibernate in suitable cave, mineshaft, and adit habitats. The hibernation season on the BHNF has been defined as October 1-May 15 (USDA Forest Service 2015c). During the summer, bats use live and dead trees for daytime roosting. Females with young pups congregate in larger trees and snags in communal maternity roosts. Males have shown less specificity and will choose a variety of snag sizes and cavities in both live and down dead trees. A study conducted in the Black Hills indicated that this bat selects the largest snags available and sites with a greater abundance of snags when compared to random sites (Cryan et al. 2001). There is no designated critical habitat for northern long-eared bat on the BHNF.

In June-July 2017, researchers from the University of Wyoming (WYNDD) identified sixteen trees being used by reproductive (pregnant or lactating) female northern long-eared bats (unpublished data) on the Bearlodge Ranger District, BHNF. Large diameter hard snags were being utilized as roosts as expected, but a number of roost trees were live, large-diameter (≥18”) ponderosa pine with large burn scars that had started to rot out. Many of these burn scars also had old woodpecker cavities that bats were observed exiting at some roosts. Three live aspen trees, with cavities or cracks, were also being used by reproductive females as roost trees.

As described by the BHNF northern long-eared bat Programmatic Biological Assessment (BA; USDA Forest Service 2015c), activities of the types proposed by this project may have positive or negative effects on northern long-eared bat. “On the landscape scale, activities to make forested stands more resilient to catastrophic wildfires and insect and disease epidemics are likely to have an overall positive effect, though these natural disturbance events do create snags that may become suitable roost trees. Maintaining a mosaic of forest stand structure through vegetation management activities has more benefit in the long-term for bat conservation than an ‘ocean of snags’ that may be present on the landscape for a relatively short time following large scale wildfires and mountain pine beetle infestations”.

The Programmatic BA also concluded that implementation of Forest Plan snag conservation measures should ensure that northern long-eared bats will continue to have adequate roosting habitat. The Proposed Action would retain snags consistent with Standards 2301a-b and 2305. Therefore, the Proposed Action is not expected to directly reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Direct mortality could result if unknown, occupied maternity roost trees are cut. Of the known roost trees described above, one is within a potential CTA and a 150-foot buffer around it includes part of another CTA. Aspen regeneration treatments may potentially affect two known bat maternity roost trees in a 131-acre stand. One additional maternity roost tree is within a non-CTA stand that may be treated to enhance aspen. Lastly, one roost tree is within a proposed fuel treatment area. In total, five known maternity roost trees are within potential treatment areas. Design features to protect known roost trees and the adjacent habitat should maintain roost site suitability.

Cryan et al. (2001) concluded that timber harvest and tree thinning activities are not expected to decrease the long-term suitability of these areas as northern long-eared bat roosting habitat (as studied in the southern Black Hills). Prescribed burning is expected to have negligible effects on the bat given the timing of these burns (generally during the hibernation season) and burn plans that mitigate the effects from smoke and heat.

Proposed vegetation management activities would create noise that may disturb roosting bats during the active season. This noise disturbance may result in adverse effects if female bats flee maternity roost trees, resulting in abandonment or reduced survival of their young.

The No Action alternative would cause no immediate effects to the bat or its habitat. Neither alternative is likely to result in the introduction or spread of the fungus that causes white-nose syndrome, the primary threat to the bat's continued existence.

Determination: The Proposed Action may affect the northern long-eared bat. Pursuant to the *Optional Framework to Streamline Section 7 Consultation for the Northern Long-Eared Bat*, each action agency must make a two-step determination as to whether its activity is excepted from incidental taking prohibitions in the final 4(d) rule. To that end, the Proposed Action would not purposefully take the bat. Second, the BHRL project area is located wholly outside the white-nose syndrome zone. In the absence of white-nose syndrome, none of the proposed activities, alone or in combination, would be likely to have significant population-level effects**.** Overall, adherence to Forest Plan standards and guidelines would conserve the bat and its habitat. The No Action alternative would not affect this species.

Region 2 (R2) Sensitive Species

Sensitive species (SS) are those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by: Significant current or predicted downward trends in population numbers or density. And significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (Forest Service Manual (FSM) 2670.5).

The most recent Region 2 SS wildlife list (FSM R-2 Supplement 2600-2017-1, effective June 29, 2017) was reviewed and species that may occur in or near the Black Hills were identified. A pre-field wildlife review of the project area for all Region 2 SS was completed using Heritage database records, district data, literature reviews, communication with district personnel and the Forest Plan to identify which SS occur within the project area or have potential habitat within the project area. All sensitive species on the Forest occur within the project area or have potential

habitat within the project area and are carried forward in the impacts analysis. Cumulative impacts are discussed on page 60 of this report.

The black-backed woodpecker and grasshopper sparrow are also designated as MIS and are also discussed under the MIS section.

American Peregrine Falcon

In the Black Hills, the peregrine falcon is an uncommon spring and rare fall migrant and rare winter visitor. Nest sites may occur in deep rocky canyons or other places with tall cliffs. Historical records indicate peregrine falcon nesting occurred in the Black Hills in the 1960s. Efforts to reestablish a breeding population through cross-fostering and hacking in the late 1970s and late 1990s (Sharps and O'Brien 1985) were unsuccessful. Between 2001 and 2007, the Monitoring the Birds of the Black Hills program did not detect peregrines in the Black Hills (Giroir et al. 2007). In 2017, the South Dakota Department of Game, Fish and Parks located two pairs of breeding peregrines in the Black Hills, but the exact nest locations are unknown to us at this time. Peregrine falcons eat mostly birds, though mammals and other species may be taken. When hunting, peregrines start by watching from a high perch or by flapping slowly or soaring at great height. Aerial dives begin above their prey and end either by grabbing the prey or by striking it with their feet hard enough to stun or kill it.

Direct and Indirect Impacts

No direct or indirect effects on nesting habitat are anticipated under either alternative because of the inaccessibility of rock cliffs preferred for nesting and the lack of proposed activities in these areas. The No Action alternative would not affect foraging habitat or nesting behavior. Under the Proposed Action, implementation of standard 3204 (which protects raptor nests) in coordination with the South Dakota Department of Game, Fish and Parks, is expected to prevent disturbance that would disrupt normal nesting behavior.

Determination: Both alternatives would have ***no impact*** on peregrine falcons because nest sites would not be disturbed and nesting/foraging habitat or behavior would not be modified to a degree that would adversely impact individuals.

Bald Eagle

Bald eagles are primarily winter residents in the Black Hills, usually arriving in early November and leaving by March or April. Bald eagles are often associated with large lakes and rivers. The bald eagle population is in an upward trend (Burns 2012).

An unsuccessful nesting attempt was reported adjacent to the southern BHNF in 2004. In 2007, another unsuccessful nesting attempt occurred at Deerfield Lake in the central Black Hills. This was the first recorded nesting attempt in the BHNF in recent times. The nest has continued to be active with young successfully fledged. Suitable nesting habitat occurs in dense, mature pine stands near major lakes and streams in the project area (Burns 2012).

In 2006, a winter night roost was discovered at Pactola Reservoir (USDA Forest Service 2007). Approximately 18 to 22 eagles were observed at the roost on four separate occasions between late December 2005 and late January 2006. The roost covers at least 100 acres of mature to late-successional ponderosa pine forest on very steep slopes. Large trees and snags are abundant. The lake was not completely frozen over at the time.

Direct and Indirect Impacts

Alternative A

No direct mortality would occur at the Deerfield Reservoir nest because it is in MA 8.2 (Developed Recreation Complexes), which is not within the project area. Some individual bald eagles may avoid treatment areas when proposed activities are in progress, but alternative roosting/foraging habitat is likely available nearby. Indirect effects may occur if suitable nesting/roosting habitat is removed through vegetation management activities. Potential nesting/roosting habitat around Pactola, Deerfield, and Sheridan Reservoirs is excluded from the project area (Figure 2, page 4) and would not be affected by proposed activities. Potential nesting habitat near other water bodies may decline, but this is not likely a limiting factor. The Proposed Action would not affect the availability of carrion, which is the primary winter food source. Proposed activities may be restricted within one mile of the communal roost at Pactola Reservoir from November 1 through April 1 (Forest Plan standard 3101c). Any newly discovered nests would be protected through avoidance and timing restrictions (standards 3204 and 3101).

Alternative B

No **direct** or **indirect impacts** are expected because no new activities would occur under this alternative. The primary winter food source, deer carrion, is expected to continue to be available. Suitable nesting and roosting habitat is likely to increase through forest succession with no active management.

Determination

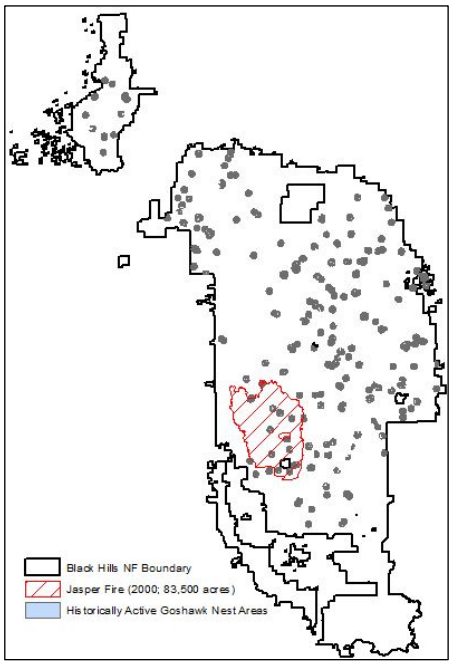
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** This alternative would comply with Forest Plan standards relevant to bald eagle protection. The No Action alternative would have ***no impact***.

Northern Goshawk

The northern goshawk is a large predatory bird. It is easily disturbed, secretive, and very defensive of its young. In the northern Rocky Mountains, a typical goshawk nest area is a single-storied, mature or late successional coniferous stand with a dense canopy and clear forest floor on a north-facing, moderate slope (Hayward and Escano 1989, Squires and Ruggiero 1996, Kennedy 2003). Goshawks tend to select stands that have relatively large trees and relatively high canopy closure (Kennedy 2003). Reynolds et al. (1992) characterized the nest area as mature and old stands with canopy closure greater than 50 percent. Dense, mature ponderosa pine stands (SS 4C and 5) at least 30 acres in size likely best meet these conditions in the Black Hills. Moderately dense, mature pine forest (SS 4B) may also provide some additional nesting habitat. Goshawks return to the same territory year after year.

Reynolds (USDA-Forest Service 2000) estimated the BHNF could potentially accommodate 300 territories, based on densities found on the Kaibab Plateau in Arizona and assuming the Black Hills has the same densities, under the right conditions. BHNF biologists have documented and manage for approximately 132 territories across the BHNF. Habitat conditions at some of these historic nest areas have changed over time, due to wildfire, mountain pine beetle infestation or vegetation treatments. For example, nine historic and/or active goshawk territories were lost in 2000 from the Jasper Fire. Occupancy at nest sites is likely to decrease when conditions are no longer suitable for goshawk nesting. Forestwide, the percent of territories occupied has fluctuated over the years in large part as a result of survey effort (USDA-Forest Service 2015b). In part this is expected because the mature, dense forest conditions that are favorable to goshawk nesting are also susceptible to mountain pine beetle infestation and subsequently may not be sustainable at the optimal level for goshawks.

Reynolds et al. (2017) reported the results of a 20-year investigation of goshawks on the Kaibab Plateau and found large inter-annual variation in the proportion of pairs laying eggs, brood sizes, nest failure rates, and fledgling production. Inter-annual variation in reproduction closely tracked inter-annual variation in precipitation, which they hypothesize influenced primary forest productivity and bird and mammal prey abundance. This relationship has not been studied on the Black Hills where the amount of annual precipitation may be similar to the Kaibab Plateau, but where the majority of precipitation falls as rain between April-July versus the Kaibab Plateau where most of the precipitation occurs in the winter as snow. Information on the historic precipitation regime can be found in the Watershed Report in the Project Record.



In the Black Hills, goshawks nest in dense, mature stands, primarily those with basal area ranging from 130 to 245 square feet per acre (Bartelt 1977, Erickson 1987). Preferred nest trees are ponderosa pine, often the largest tree in the stand (Erickson 1987). In the first long-term study of goshawks in the Black Hills, Knowles and Knowles (2010) documented that nest stands in mature and old-growth ponderosa pine stands averaged 266 trees per acre, a basal area of 128 square feet per acre, and an average tree diameter of 10.2 inches. Squires (USDA-Forest Service 2000) indicated nesting habitat is the most important component of goshawk management; nesting is what tends to limit distribution and numbers of birds, even though there are foraging requirements as well.

Graham et al. (2015) alluded that prey availability may be a more important factor than a shortage of nest sites when it comes to goshawk reproduction. Goshawks use a mosaic of structural stages for foraging (Kennedy 2003). Goshawks hunt in diverse habitats and are considered generalist predators, feeding mostly on prey that occupies the ground through lower canopy zones. Graham et al. (2015) designed a silvicultural system to create and maintain forest conditions for the goshawk and its prey. This system arranged trees in clumps and groups with

minimal ladder fuels present and high canopy cover within the larger tree clumps/groups for tree squirrel (prey) habitat while minimizing the risk of bark beetle attack. Snags, downed logs, and woody debris are an important component of the post-fledging family and foraging habitat. The BHNF currently has more than three snags per acre, of which at least 25 percent are greater than 14 inches in diameter (objective 211, USDA-Forest Service 2015b). Many of the existing snags resulted from the recent mountain pine beetle epidemic.

Because beetle-killed snags typically stand for only five to seven years (Schmid et al. 2009), areas with high levels of tree mortality due to beetle infestation are expected to have few standing snags in the near future. Structural stage objectives for MAs 4.1, 5.1, 5.4, 5.43, and 5.6 were designed to provide a diversity of ponderosa pine habitats where vegetation management activities are most likely to occur, with the intent of providing a balance of conditions for goshawk foraging and nesting habitat (among other species) across the BHNF. Due to mountain pine beetle infestation, timber harvest, and wildfire, structural stages that may provide nesting habitat are currently below objectives. The objectives' desired condition for dense, mature pine totals 35 percent of the pine forest area. These structural stages currently form approximately 22 percent of the pine forest area in the five management areas with structural stage objectives. Most of this habitat is in the northern and eastern Black Hills and the Bear Lodge Mountains (Graham et al. 2015). Very little exists in the central Black Hills, and areas such as the Jasper Fire, which burned 83,500 acres in 2000 in the southern Black Hills is low-quality nesting habitat. Due to the habitat's range in quality and uneven distribution, along with the territorial nature of goshawks, not all of the existing potential nesting habitat is occupied.

According to Forest Plan standard 3108, nest areas shall consist of 180 acres best suited for nesting habitat within one-half mile of the nest and greater than 300 feet from buildings. Nest areas need not be contiguous, but must occur in 30-acre units or larger and include alternate nests if known. If these conditions cannot be met, then nest areas will include stands that are not currently suitable but that could be managed to meet nesting conditions over time. Vegetation manage activities within nest areas shall be limited to those that maintain or enhance the stand's value for goshawk.

As part of the BHRL project analysis, BHNF wildlife biologists assessed existing conditions in known goshawk territories. Using data from nest surveys, the BHNF vegetation database, and aerial imagery, the biologists identified potentially suitable nesting habitat (dense, mature pine) within one-half mile of each individual nest or concentration of nests in a single territory.

The assessment revealed that, on average, approximately 18 percent of each half-mile buffer is potentially suitable nesting habitat. Twenty-four of the 132 known territories include at least 180 acres of suitable nesting habitat. Over the last 20 years, most nest areas have undergone a significant reduction in dense, mature pine habitat due to mountain pine beetle infestation, timber harvest, and wildfire. Most of the existing suitable habitat is in the northwestern part of the BHNF, where beetle infestation and associated timber harvest have been less extensive.

Forest Plan standard 3111 directs the Forest Service to minimize additional human-caused noise and disruption beyond that occurring at the time of nest initiation within one-half mile of active goshawk nests from April 1 through August 15 or until fledglings have dispersed or the nest has

failed. In some cases, due to the urgency associated with activities in beetle-infested stands, this timing restriction has been lifted if biologists find no evidence of goshawk activity. Disturbance during courtship and brooding can cause nest failure or cessation of nest construction (Lynch pers. comm. 2017).

Direct and Indirect Impacts

Alternative A

The Proposed Action would have the potential to cause mortality and loss of nesting and foraging habitat. Known goshawk nest areas would be protected in accordance with Forest Plan standards 3108 and 3111.

Adverse impacts could occur if there are existing, unknown goshawk nest areas that are not detected prior to implementation of proposed activities. Knowles and Knowles (2010) reported that 29 of 30 active nests were abandoned when commercial timber harvest occurred within one-quarter mile. If new nests are found during implementation, adherence to Forest Plan standard 3115 (*"R2 sensitive species or species of local concern located after contract or permit issuance will be appropriately managed…"*) would protect the nest from further disturbance.

In Management Areas 4.1, 5.1, 5.2A, 5.4, 5.43, and 5.6, commercial removal of trees (DBH ≥ 9 inches) from shaded fuel break construction is proposed on up to 4,000 acres along roads, in the WUI and around infrastructure. Of the approximately 144 nest area complexes (multiple nest areas may be included in one territory), no fuels treatments of structural stages 4B and 4C would occur in 61 nest areas. There are about 1,490 acres of 4B stands and 570 acres of 4C stands within the 0.5 mile buffer around the remaining 83 known goshawk nest areas that are within 300 feet distance of the shaded fuel breaks along roads. Per the Forest Structural Diversity Design Feature 3b, fuels managers and silviculturists would design shaded fuel breaks in SS 4B/4C stands in coordination with a Forest Service wildlife biologist to avoid/minimize the loss of this potential goshawk nesting habitat.

The Phase II Amendment FEIS determined that adequate habitat for maintaining a viable goshawk population would exist if standards and guidelines are followed and conditions move toward habitat objectives. Due to mountain pine beetle infestation and response actions, moderately dense, mature pine forest is currently below Forest Plan objectives in most management areas. In addition, dense, mature pine forest is below the objective in MA 5.1, and late succession forest is below objectives in all MAs that have objectives.

No activities that may decrease late succession characteristics would occur in late succession stands (design features). Fuel breaks may occur in various management areas but would be focused on MA 5.4, which has a higher percentage of dense forest than other MAs. Close coordination with wildlife biologists would be required during layout and implementation to assess tradeoffs between potential habitat and fuel break location. While potential habitat is likely to decrease, the above measures would prevent loss of known nest areas, decrease the likelihood of adverse effects on unknown nest areas, and maintain most existing, potential nesting habitat while increasing potential public and firefighter safety in key locations focused in the WUI, along roads and near infrastructure. Also, a forest structural diversity design feature would retain some of the structural stage 4A stands with higher canopy closure to transition into

structural stage 4B, which is below the Forest Plan objective and may provide future goshawk nesting habitat.

Foraging habitat in treated areas would differ by treatment and over time. This may increase goshawk prey associated with open habitat, such as flickers and chipmunks, and decrease prey associated with closed canopy habitat, such as red squirrels and northern flying squirrels. Goshawks may be disturbed in foraging areas by proposed activities. Spring prescribed fire may result in nest abandonment, though Reynolds et al. (1992) recommend prescribed fire to perpetuate forests of different ages as this may enhance nest stand characteristics, provide habitat for goshawk prey, and improve hunting habitat. Thinning of small trees in potential and current goshawk nest stands would help maintain desirable nest stand characteristics. Road construction and use may cause nest abandonment if conducted near nests during nesting season. Aspen and oak enhancement activities would maintain or improve these habitats for goshawk foraging.

Alternative B

Over time, the No Action alternative could result in loss of some foraging and nesting habitats as density of small pine and other understory vegetation increases. Additional closed-canopy potential nesting habitat would be likely to develop in the long-term as some of the open, mature pine stands grow toward denser conditions and as young forest continues to mature. Increased difficulty of fire suppression and potential for high-severity fire could raise the risk of habitat loss.

Determination and Rationale

The combined representation of potential goshawk nesting habitat is below management area structural stage objectives. The Proposed Action would add minimally to these losses in the interest of public safety by constructing shaded fuel breaks in the WUI, along roads and around infrastructure. It may result in harm to individual goshawks, though adherence to Forest Plan standards is expected to minimize this potential. At the same time, the Proposed Action would reduce density of regenerating pine and other understory vegetation through precommercial thinning, prescribed fire, and other fuel reduction activities, facilitating development of mature stands and enhancing goshawk foraging habitat. The No Action alternative could result in an eventual decrease in suitability of foraging and nesting habitats. As a result, both alternatives ***may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** With implementation of Forest Plan standards and guidelines, goshawks are expected to persist on the BHNF.

Northern Harrier

The northern harrier is an uncommon migrant and summer resident in the Black Hills. Harriers are open-country hawks that are commonly found in prairies, wetlands, marshes, meadows, croplands, and shrublands (Slater and Rock 2005). Associated topography is generally flat. Most nest sites are in undisturbed wetlands or grasslands dominated by thick vegetation (Slater and Rock 2005). Large open areas are limited on the Forest, which probably constitute the most limiting factor for harriers on the Forest. Currently, there are approximately 75,307 acres of grassland and meadow habitat on the Forest, but much of this occurs in linear meadows or isolated patches that are likely too small to support birds. Larger blocks of grassland habitat occur across the Black Hills due to past wildfires, particularly in the southern Black Hills. Forest

Plan Standard 3204 provides direction to protect known raptor nests. There are no known harrier nests on the Forest or in the project area.

Direct and Indirect Impacts
Alternative A
Under the Proposed Action, removal of pine from grasslands on 14,200 acres may maintain or enhance potential harrier foraging habitat. Any harrier nests would be protected consistent with Forest Plan standard 3204. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving habitat for harriers.

Alternative B
No **direct** or **indirect impacts** are anticipated. Forest succession may result in negligible decrease in suitable open harrier habitat.

Determination
Alternative A may have a slight ***beneficial impact*** by creating and enhancing open habitat. Alternative B is expected to have ***no impact***.

Burrowing Owl
The western burrowing owl is a grassland specialist of western North America, occupying open areas with short vegetation and bare ground (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, either by cattle or prairie dogs (McDonald et al. 2004). 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 used (Johnson and Anderson 2002, Klute et al. 2003). 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).

Burrowing owls were observed in 2004 and 2006 by the Rocky Mountain Bird Observatory during ongoing breeding bird monitoring (USDA-Forest Service 2010). The 2004 observation was associated with a prairie dog town on the Hell Canyon Ranger District. Two adults and three chicks were observed at two nests in 2007 (Burns 2012).

Direct and Indirect Impacts

No **direct** or **indirect impacts** are anticipated from either alternative. Neither alternative proposes treatments in prairies or prairie dog towns on the Forest nor are treatments expected to create large, open grasslands of sufficient size to be used by prairie dogs or burrowing owls.

Determination

Either alternative would likely have ***No Impact.***

Flammulated Owl

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). 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). The ponderosa pine structural stages corresponding most closely to flammulated owl nesting and foraging habitat on the Forest are 4A, 4B, 4C and 5.

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. Nest site characteristics across three studies in New Mexico and Oregon documented owl in snags that averaged between 19 and 28 inches dbh. Large snags such as these are rare in the Black Hills.

There have been two reports of flammulated owls in the Black Hills 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. An effort was made to verify flammulated owls at the two recent observation areas and other seemingly suitable sites during 2003, but was not detected (Fauna West Wildlife Consultants 2003). At present, there is no indication suggesting that flammulated owls are established or breeding in the Black Hills.

Direct and Indirect Impacts

Alternative A

If flammulated owls are present in the Black Hills, the Proposed Action could cause direct mortality and decrease suitable habitat by removing large trees and snags (in the form of hazard trees) and thinning dense stands. The Proposed Action would treat 185,210 acres of open, mature pine forest, but the remaining acreage would still be above the desired structural stage percent. Dense, mature pine forest may decrease on up to 4,000 acres for shaded fuel breaks, but this impact would be reduced by retaining the best habitat when possible through coordination of activities with wildlife biologists. A percentage of snags would be lost through hazard tree cutting, typically adjacent to roads and infrastructure, which is not considered the highest value habitat. Any decrease in dense, mature pine acreage in MA 5.1 would move conditions further from Forest Plan objective 5.1-204.

The Proposed Action would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

The project would contribute toward achievement of Forest Plan objective 221 by conserving potential flammulated owl habitat, unless dense, mature pine forest is decreased in MA 5.1. Because activities in dense, mature forest are to be focused away from this management area, any decrease is expected to be minor.

Alternative B
Selection of the No Action alternative may eventually result in increased potential flammulated owl habitat in the form of dense forest.

Determination
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing***, though the risk is very low given the unconfirmed status of a breeding population in the BHNF. The No Action alternative would have ***no impact***.

Lewis's Woodpecker
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, Abele et al. 2004). 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 typically excavate nest cavities in soft ponderosa pine or cottonwood snags, although they will also re-use cavities made by other woodpecker species. 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).

Recent bird monitoring on the Black Hills has detected an average of 6 birds each year since 2001 (White and Giroir 2009). Breeding Bird Survey (BBS) data suggests that many populations of Lewis's woodpeckers may have declined since the 1960s (Sauer et al. 2011; Tobalske 1997). 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.

Relevant MAs within the project area include 435,730 acres of open, mature to old ponderosa pine forest (Structural stage 4A and 5). Pockets of open forest could also occur within the denser structural stages in the project area. Suitable habitat exists well above desired objectives for this bird.

Direct and Indirect Impacts
Alternative A
The project area includes approximately 410,000 acres of open, mature or late succession ponderosa pine forest. Pockets of open forest also occur within the denser structural stages in the project area. Suitable open habitat exists well above desired objectives.

The Proposed Action could result in direct mortality if occupied nest trees are cut, but adherence to standards 2301 and 2305 would prevent cutting of snags except those that are a safety hazard.

Mature trees and open, mature pine forests preferred by Lewis's woodpeckers would decrease. Acreage of these stands would remain above Forest Plan objectives and are not expected to be a limiting factor.

The Proposed Action would not reduce snag occurrence below Forest Plan objective 211 levels. Activities other than patch clearcut would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Alternative B
The No Action alternative would have no direct effects. Over time, some currently open pine stands may become too dense to provide suitable woodpecker nesting habitat. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving Lewis's woodpecker habitat.

Determination
Both alternatives ***may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.***

Black-backed Woodpecker
Status of black-backed woodpeckers are discussed in the MIS section.

Direct and Indirect Impacts
Alternative A
Implementation of the Proposed Action could cause direct mortality and loss of potential habitat in the form of snags (hazard tree removal) and live, dense forest. In accordance with Forest Plan standards 2301 and 2305, snags would be retained unless they pose a hazard. The Proposed Action does not include post-fire salvage.

Proposed fuel break construction would decrease potential habitat in the form of dense, mature stands of live pine by up to 4,000 acres, but this impact would be reduced by coordination with wildlife biologists to retain the best habitat when possible. The Phase II Amendment FEIS determined that adequate habitat for maintaining viable populations would exist if standards and guidelines are followed and conditions move toward habitat objectives. Due to mountain pine beetle infestation and response actions, dense, mature pine forest is below the Forest Plan objective level in MA 5.1, and late succession pine forest is below objectives in all MAs that have objectives. No activities that may decrease late succession characteristics would occur in structural stage 5 stands (design features). Fuel breaks may occur in various management areas but would be focused on MA 5.4, which has a higher percentage of dense forest than other MAs. Close coordination with wildlife biologists would be required during layout and implementation to assess tradeoffs between potential habitat and fuel break location. The Proposed Action would conserve most of the suitable black-backed woodpecker habitat in live forest while increasing potential public and firefighter safety in key locations.

Proposed precommercial thinning, prescribed fire, and fuel treatments would reduce density of stands of small trees, facilitating growth of residual pine seedlings and saplings. Instead of stagnating, thinned stands would transition into mature forest within 20 to 40 years.
The Proposed Action would reduce the potential for large, stand-replacing wildfires, which create preferred black-backed woodpecker habitat. It may also decrease the potential scale of a future mountain pine beetle infestation. Under both alternatives, however, stand-replacing fires and beetle infestations will continue to occur. The objective of the Proposed Action is to reduce the scale of these events and the severity of their effects, where possible. It would conserve habitat for this species in accordance with Forest Plan objective 221 by minimizing the additional loss of dense, mature forest while trending toward the desired structural stage percentages in the long term.

Alternative B
Over time, the No Action alternative would allow development of additional closed-canopy forest. Increased difficulty of fire suppression and potential for high-severity fire could result in large, stand-replacing fires that would create black-backed woodpecker habitat.

Determination
Due to mountain pine beetle infestation, response actions, and wildfire, the BHNF has moved away from objectives for dense, mature pine forest (potential black-backed woodpecker habitat). The Proposed Action would add minimally to these losses in the interest of public safety by constructing shaded fuel breaks. It may result in harm to individual woodpeckers, though adherence to Forest Plan snag standards is expected to minimize this potential. At the same time, the Proposed Action would reduce density of regenerating pine, facilitating development of future mature stands. As a result, the Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** With implementation of Forest Plan standards and guidelines, black-backed woodpeckers would persist in the BHNF. The No Action alternative would have ***no impact***.

Grasshopper Sparrow
Status of grasshopper sparrows are discussed in the MIS section.

Direct and Indirect Impacts
The Proposed Action may result in direct mortality. Proposed removal of encroaching pine from grasslands and prescribed fire would maintain treated grassland habitats in the project area. The project would contribute toward achievement of objective 221 by maintaining or enhancing grasshopper sparrow habitat. The No Action alternative would have no immediate effects. Preferred habitat may decrease over time due to pine encroachment.

Determination
Although there may be direct impacts, risk is low overall. The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing***. Proposed activities are expected to have long-term benefits. The No Action alternative would have ***no impact.***

Loggerhead Shrike
The loggerhead shrike is a common summer resident in Wyoming and South Dakota, with breeding records occurring over most of both states (Orabona et al. 2009). The bird is rare or casual (out of normal range) in the Black Hills. Breeding records occur near the periphery of the Black Hills but not in the interior or at higher elevations. Wiggins (2005b) 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 (2005b) 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 2005b). 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. The combination of habitat features described above is distributed primarily along the southern flank of the Black Hills, especially in the southwestern portion. Most of the interior Black Hills do not provide suitable habitat because tree density is too high.

Direct and Indirect Impacts
The Proposed Action would not affect preferred shrike habitat. Potential for impacts is negligible. The No Action alternative would have no effect. The project would contribute toward achievement of objective 221 by conserving habitat for loggerhead shrike.

Determination
Either alternative is expected to have ***no impact*** to the northern shrike and its habitat.

Long-billed Curlew
Long-billed curlews are native prairie specialists, nesting primarily in shortgrass or mixed-grass prairie habitat with flat to rolling topography (Sedgwick 2006). They prefer short vegetation and generally avoid habitats with trees, abundant shrubs, and tall, dense grass (Sedgwick 2006). Curlews may use taller, denser grass during brood rearing when shade and camouflage from predators are presumably more important for chicks (Sedgwick 2006). Long-billed curlews have been observed nesting in suitable habitat on the Black Hills, mostly the southern Black Hills, during annual bird monitoring efforts (USDA-Forest Service 2010). A decline has been observed in South Dakota (Sedgwick 2006).

Direct and Indirect Impacts
The Proposed Action would not affect long-billed curlews due to lack of activities in native short- grass or mixed-grass prairies. The No Action alternative would have no effect. The project would contribute toward achievement of objective 221 by conserving habitat for this species.

Determination
Either alternative is expected to have ***no impact*** to long-billed curlews or their habitat.

Yellow-billed Cuckoo
In western South Dakota and eastern Wyoming, the species is a rare to uncommon breeder (Wiggins 2005c). The yellow-billed cuckoo is considered a riparian obligate species (Nicholoff 2003). Yellow-billed cuckoos prefer to nest in open woodlands with a dense understory and near water. They typically inhabit wooded river valleys in the Great Plains (Wiggins 2005c). Breeding habitat in the Black Hills occurs mainly in low-elevation riparian areas. 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. Breeding has been documented in the Bear Lodge Mountains and likely occurs elsewhere at lower elevations (Panjabi 2003). The site was a mature, bur-oak woodland that had a well-defined understory and very large-diameter trees (Panjabi 2003). Yellow-billed cuckoos are extremely sensitive to habitat alterations (Nicholoff 2003, Wiggins 2005c). Major causes of degradation have included grazing, placer mining, cultivation, road development, dam construction, channel realignments, urbanization, and loss of riparian habitat (Wiggins 2005c).

Direct and Indirect Impacts
The Proposed Action may cause direct mortality. Risk is considered to be low because this bird nests along riparian areas, which would largely be avoided during management activities. Proposed commercial timber harvest, thinning, and prescribed fire may indirectly benefit this species by maintaining and enhancing hardwood habitat, particularly oak. The No Action alternative would have no direct or immediate indirect effects. Over time, lack of activity could result in gradual decline of potential habitats due to pine encroachment. The project would contribute toward achievement of objective 221 by conserving habitat for yellow-billed cuckoo.

Determination
The Proposed Action and No Action alternative ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** Overall, proposed activities would have long-term benefits.

Region 2 Sensitive Bats
Three Sensitive bat species may occur in the project area. Each is described separately below, followed by a combined analysis of effects on all species.

Fringed Myotis
The fringed myotis is an insectivorous year-round resident bat of the Black Hills. It can be found during the summer but is very difficult to locate during the winter (USDA-Forest Service 2000).The Black Hills population of the fringed myotis is a disjunct population and recognized as belonging to a distinct subspecies, *Myotis thysanodes pahasapensis*. 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 2003e).

This bat 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 2003e). In the Black Hills, 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 2003e). In the Black Hills, maternity roosts recorded for this species include rock crevices and ponderosa pine snags (Cryan et al. 2001, Keinath 2004).

Riparian areas and water sources are important features of habitat. Open water is important because bats obtain water while flying. Riparian habitats are also important for insect production and provide foraging opportunities (USDA-Forest Service 2000).

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 2000). 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).

Townsend's Big-eared Bat

Townsend's big-eared bat is an insectivorous year-round resident in all South Dakota Black Hills counties and reported to be the most numerous bat species in Crook County, Wyoming (Schmidt 2003f). There are known maternity roosts of these bats in the Black Hills (USDA-Forest Service 2015b).

Townsend's big-eared bats occupy a variety of habitats but are closely associated with caves and mines (Schmidt 2003f, Gruver and Keinath 2006). They also use riparian areas for foraging, including wetlands and meadows. In the Black Hills, maternity roost sites are often in steep drainages with nearly vertical walls. These bats are extremely sensitive to disturbances in the vicinity of their roosts, including loud noises such as those produced by motorized off-road vehicles, discharging of firearms, and other such activities (Schmidt 2003f). Potential habitat exists throughout the BHNF in the form of caves and mines. Potential habitat also exists in snags and riparian areas.

Hoary Bat

The hoary bat generally roosts in medium to large trees with dense foliage that hides them from above, with few branches below, and is generally open. They prefer open conifer and deciduous habitat mosaics, and uses habitat edges for feeding (Tigner and Stukel 2003). This species feeds chiefly on large moths and to a lesser extent on other insects over clearings, along forest edges and near water where prey may be more abundant. Risks to this species is loss of suitable habitat during critical periods, reduced foraging habitat, and chemical spraying that reduces prey, human disturbance and predation (SDGFP 2004). Rapidly changing habitat conditions are considered a substantive and imminent threat to the hoary bat (USDA-Forest Service 2011).

In South Dakota, the hoary bat ranges throughout the state and has been documented breeding in Lawrence, Pennington, Custer and Fall River counties in the Black Hills (Higgins et al. 2000, Tigner and Stukel 2003). It occurs in Crook and Weston Counties in Wyoming. Potential forest habitat exists throughout the project area. Snag habitat created by pine beetles appear abundant (USDA-Forest Service 2015b) but beetle snags do not last long (5-7 years). Forests, water sources and riparian habitat that provide abundant prey species are found throughout the project area.

Direct and Indirect Impacts (All Region 2 Sensitive Bats)

Alternative A
The Proposed Action could result in direct mortality due to tree and snag (hazard tree) felling. Activities conducted when maternity roosts consist of females with pups that cannot yet fly pose the greatest mortality risk to bats. Potential loss of occupied daytime roost trees may negatively impact individuals. The Proposed Action would reduce the number of large trees and snags, primarily hazard trees, while increasing open forests. It would not reduce snag occurrence below objective 211 levels. Activities other than patch clearcuts would retain live trees that may provide future snags. Patch clearcuts would be relatively small (less than 10 acres each) and scattered within a matrix of live forest.

Adherence to Forest Plan standards 1401, 3102, and 3207 would protect known and potential nurseries and hibernacula. The project would contribute toward achievement of objective 221 by conserving habitat for these bat species.

Alternative B
The No Action alternative would have no direct or immediate indirect effects. Over time, formation of additional snags may increase roosting habitat.

Determination
The Proposed Action ***may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing***. The No Action alternative would have ***no impact***.

American Marten
Martens were reintroduced into the Black Hills beginning in 1981. They are found in a narrow range of habitat types associated with coniferous forests (Buskirk 2002) and require late successional stands of mesic conifers, especially those with complex physical structure near the ground (Buskirk and Powell 1994, Buskirk and Ruggiero 1994). Potential marten habitat in the Black Hills is based on the distribution of white spruce. Ponderosa pine is not considered optimal habitat, although there is evidence that martens use pine habitat in the Black Hills. Rocks, low-lying branches, fallen logs, and stumps (Davis 1983) and lush forb and shrub vegetation on or near the ground and subnivean sites (Buskirk 2002) provide thermal and protective cover as well as hunting habitat. They stay close to overhead cover, and are intolerant of habitat types with less than 30 percent canopy cover (Buskirk and Powell 1994).

According to Fecske (2003), the greatest marten concentrations in the Black Hills appear to be in the northern part of the BHNF and in and around the Norbeck Wildlife Preserve. These two dominant subpopulations are likely to be very important in maintaining species persistence in the Black Hills (Burns 2012).

Due to the limited distribution of spruce in the Black Hills, most marten territories contain some drier pine sites (Buskirk 2002). Mature and late-successional pine stands also help maintain connectivity between spruce stands. In the Bear Lodge Mountains, where spruce is absent, martens use dense, mature pine habitat.

Marten population trend was relatively stable in the Black Hills through 2003 (USDA Forest Service 2004). The BHNF is conserving marten habitat (spruce) (USDA Forest Service 2015b), but population trends since 2003 are unknown. Mature, dense pine habitat has decreased since that time.

Direct and Indirect Impacts

Alternative A
The Proposed Action could cause direct mortality. The greatest threat the BHRL project poses to martens is additional fragmentation and loss of habitat. Although not specifically targeted, spruce may be treated in shaded fuel breaks and mixed stands. Spruce-dominated habitat would remain above the Forest Plan objective of 20,000 acres. Potentially suitable habitat for marten and their prey species in mature, dense to moderately dense ponderosa pine stands may decline by up to 4,000 acres due to creation of shaded fuel breaks. Generally, this would occur in the WUI, along roads, and near infrastructure, areas not typically considered the most desirable marten habitat. Snags (hazard trees) and coarse woody debris would decrease due to fuel reduction and other activities, though Forest Plan objectives would continue to be met.

Proposed road construction and conversion in or adjacent to marten habitat would reduce marten habitat by about five acres per mile of road (Rowland et al. 2004). Activities occurring in or near spruce or suitable dense, mature pine habitat may cause some disturbance to marten.

The Proposed Action would comply with relevant Forest Plan standards, including 2308, 3117, and 3215. The Proposed Action would not decrease spruce below 20,000 acres and thus would contribute to achievement of the spruce objective. Dense, mature pine forest may decrease by up to 4,000 acres. Any decrease in 4C acreage in MA 5.1 would move conditions further from Forest Plan objective 5.1-204 and may affect marten habitat or connectivity corridors. A sufficient quantity and distribution of habitat would remain in the spruce zone so that marten would persist in the BHNF.

The Proposed Action would contribute toward achievement of Forest Plan objective 221 by conserving potential marten habitat, except where dense, mature pine forest is decreased in MA 5.1. Because activities in dense, mature forest are to be focused away from this management area, any decrease is expected to be minor.

Alternative B
Alternative B would have no **direct impacts or indirect impacts** (loss of habitat) on marten because no treatments would occur. Spruce habitat is not expected to change noticeably in the next 10 years and may increase slightly. Closed canopy pine stands are expected to be maintained and expanded. Connectivity between spruce habitat and adjacent dense pine habitat would increase. However, if a wildfire occurs, suitable habitat could decline. Generally, preferred spruce and pine habitat would be maintained and increase with no treatments.

Determination:
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** The No Action alternative would have ***no impact***.

Rocky Mountain Bighorn Sheep
Rocky Mountain bighorn sheep inhabits alpine meadows, foothills, cliffs, and rock outcrops (Orabona et al. 2009, Beecham et al. 2007). Alpine habitat is not found in the Black Hills. The Rocky Mountain bighorn sheep race was introduced to the Black Hills in 1924, after the native Audubon's race was exterminated.

Merwin (2000) suggested bighorn sheep selected areas with good visibility (less than 40 percent canopy closure) within suitable distance of water and escape terrain. Limits to persistence include limited availability of habitat on the Forest, vulnerability of habitat to residential development on adjacent private lands, and disturbance from recreation (Benzon and Halseth 1999). Within the relevant MAs there are 621,508 acres of ponderosa pine stands that provide good visibility (Structural Stages 1, 2, 3A, and 4A) within the project area. Although bighorn sheep distribution is restricted to a several areas of occupied habitat across the BHNF, open habitat areas are currently 55% over desired objective levels.

Bighorn sheep occur in small areas of the Black Hills within four herds, occupying Custer State Park, Elk Mountain, Rapid Creek drainage and the vicinity of Deadwood, SD. The SDGFP Bighorn Sheep Management Plan (2013) provides additional information regarding South Dakota's management direction. Monitoring indicates that the bighorn sheep population estimate for the Black Hills proper has increased from 2004-2006 and has remained stable through 2009, with approximately 350 animals (Burns 2012). Recent SDGFP population estimates place the bighorn sheep number at around 300 (SDGFP 2017). The Forest is conserving habitat for the bighorn sheep consistent with Objective 221 based on the trend in bighorn sheep numbers (USDA-Forest Service 2015b).

Direct and Indirect Impacts

Alternative A
The Proposed Action may disturb and displace bighorn sheep during treatment activities. Open forest conditions that provide good visibility and additional foraging habitat for bighorn sheep would increase. If open forest conditions occur in bighorn sheep use areas near water and escape terrain, habitat could improve. The project would contribute toward achievement of Forest Plan objective 221 by conserving and enhancing bighorn sheep habitat.

Alternative B
The No Action alternative would, over time, result in a decrease in preferred open habitat. This habitat is not currently a limiting factor.

Determination
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing***. The No Action

alternative would have ***no impact***. Bighorn sheep and their habitat would persist under either alternative.

Black-tailed Prairie Dog

Black-tailed prairie dogs are associated with shortgrass and mixed-grass prairies but require sites with soils conducive to burrowing. Suitable prairie dog habitat on the BHNF is limited to non-rocky grassland soils on the Hell Canyon Ranger District (Burns 2012). The Forest manages for 200 to 300 acres of prairie dog towns in at least three separate towns (Objective 237). There are currently 11 known prairie dog colonies on the Forest, covering approximately 225 acres of National Forest land (USDA-Forest Service 2015b).

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 (greater than 1,000 acres) of potentially suitable prairie dog habitat are not present on the Forest. The colonies are comparatively small and disjunct from adjacent known colonies (Burns 2012). Prairie dog towns have remained stable or increased in size on the BHNF, however, the Forest is at the lower limit of Objective 237 (USDA-Forest Service 2015b).

Direct and Indirect Impacts

The Proposed Action proposes no treatments within prairie dog towns and would not affect prairie dogs. The project would contribute toward achievement of Forest Plan objective 221 by conserving prairie dog habitat. The No Action alternative would have no effect.

Determination

Both alternatives would have no impact on prairie dogs.

Northern Leopard Frog

The northern leopard frog is found in freshwater sites with profuse vegetation to brackish marshes and moist fields and can be found from desert to mountain meadow. This frog is primarily nocturnal and is found throughout northern North America except on the West Coast (Behler and King 1979). The leopard frog is a pond-breeding amphibian that overwinters underwater beneath the ice of streams, lakes and ponds (Smith 2003). The frog occurs in a wide variety of habitats including creeks, lakes, ephemeral wetlands, and ponds (Fischer et al. 1999; Smith 2003). Breeding habitat is limited to permanent water sources at least 6 inches in depth that do not freeze solid. After maturing, sub-adult frogs migrate to suitable feeding sites that are usually adjacent uplands. These dispersal movements may be along riparian corridors or upslope areas (Burns 2012). Adult frogs are highly mobile, moving at night or when vegetation is wet (Smith 2003). They have been found up to two miles from water (Smith 2003).

Limited data suggest that the Forest is conserving habitat for the leopard frog (Forest Plan Objective 221) (USDA-Forest Service 2015b). Additional index site monitoring is needed to determine if this is a long-term trend. Suitable habitat exists for the northern leopard frog in riparian areas throughout the project area.

Direct and Indirect Impacts
Alternative A
The Proposed Action may cause direct mortality of frog eggs, larvae, and adults. Road use can cause substantial direct mortality (Smith 2003, Smith and Keinath 2007). Ground-disturbing activities may contribute sediment into waterbodies that support frogs. Adherence to Forest Plan standards (1110, 1113, etc.), WCPs, and BMPs that minimize ground disturbing activities in riparian areas and sediment input into aquatic habitat would prevent substantial or widespread adverse effects on frog habitat. Repair of existing "connected disturbed areas" as part of proposed road work would reduce sedimentation compared to existing levels. Commercial timber harvest and other proposed activities are not expected to cause a detectable change in streamflow.

Alternative B
The No Action alternative would have no new effects. Disturbed areas connected to streams would continue to exist. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving leopard frog habitat.

Determination
Both alternatives ***may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.***

Black Hills Redbelly Snake
The redbelly snake occurs in moist woodlands with adequate cover, such as rocks, logs, tree bark, sphagnum bogs, or leaf litter. It is often found in or adjacent to riparian habitat. It is inactive from November through March (Behler and King 1979). Many Black Hills redbelly snakes have been found in riparian areas, aspen stands, mesic meadows, or meadow fringes near rocky outcrops and under various cover objects (Smith and Stephens 2003). Stumps and downed woody material are important in maintaining moist conditions; as roots of stumps decay, they provide cover (USDA Forest Service 2000, Smith and Stephens 2003). Activities that enhance riparian and aspen habitat improve habitat for the redbelly snake (USDA Forest Service 2015b).

The greatest threat to redbelly snakes populations may be the loss of moist habitats (Smith and Stephens 2003). The northern Black Hills provides more suitable habitat than other areas of the BHNF (USDA Forest Service 2000).

Direct and Indirect Impacts
Alternative A
The Proposed Action may cause direct mortality. Aspen enhancement activities, especially in riparian areas, would improve potential redbelly snake habitat. If any proposed new roads would run between wetlands and potential hibernacula, the road would be moved, not constructed, or coordinated with a wildlife biologist (Forest Plan standard 3116). Adherence to this and other Forest Plan standards (1301, 1304, 1306 and 3106), WCPs, and BMPs focused on protection of streams and riparian areas would prevent substantial or widespread adverse effects on riparian habitat. Although the Proposed Action may negatively affect individual snakes, the dominant effect would be enhancement of potential snake habitat.

Alternative B
The No Action alternative would cause no new effects. Over time, continuing encroachment of pine into moist aspen habitats may reduce potential habitat. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving redbelly snake habitat.

Determination
Both alternatives **may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing**.

Regal Fritillary
The Black Hills are at the western margin of the regal fritillary's range and requires open prairies (Royer and Marrone 1992) and wet meadows (Selby 2007). In South Dakota, the fritillary is most likely to be found in native tall-grass prairies composed of big bluestem (*Andropogon gerardii*), western wheatgrass (*Pascopyrum smithii*), and green needlegrass (*Stipa viridula*) (Royer and Marrone 1992). Continuous prairie greater than 1,000 acres may be required for stable populations (Royer and Marrone 1992). In smaller habitat patches, individuals would move in and out depending on habitat condition and size (Royer and Marrone 1992, USDA-Forest Service 2000). The Black Hills is primarily forested, and as such, contains only relatively small patches. The best habitats within the Black Hills occur in lower elevation prairies along the outer Forest boundary and in interior prairies, although tall-grass species are not predominant in the interior prairies (Burns 2012).

Female butterflies lay eggs on violets and the developing caterpillars feed exclusively on violet leaves. By late June or early July, juveniles transform to adults (Royer and Marrone 1992). Adults require a continuous source of nectar-producing flowers such as coneflowers, fleabanes, and thistles (Royer and Marrone 1992). Habitat needs of regal fritillaries are considered prior to prescribed burning in meadows and grasslands (Forest Plan Guideline 3105) (Burns 2012).

Direct and Indirect Impacts
Neither alternative would affect native mixed-grass or tall-grass prairie. Because the project area contains limited habitat for this butterfly, the Proposed Action would have no more than negligible effects on this species. The project would contribute toward achievement of Forest Plan objective 221 by conserving regal fritillary habitat.

Determination
Both alternatives would have ***no impact*** on regal fritillary.

Monarch Butterfly
This large, familiar, orange and black butterfly occurs from southern Canada in North America south to northern South America (Marrone 2002). The Monarch butterfly is dependent upon milkweed as a larval host plant. The female will lay her eggs on milkweed and the larvae will feed on this plant ingesting toxins that presumably repel bird and other vertebrate predators. The Monarch is known for its long annual winter migrations where it overwinters in large groups. One female butterfly tagged in Bowdle, South Dakota was later reported 1,776 miles away near Sierra Chincua, Mexico (Marrone 2002).

Habitat in the Black Hills region consists of open areas, including prairie, forest meadows, fields, marshes and roadsides (Marrone 2002). Monarch will nectar on a wide variety of flowers. Caterpillars may develop in any areas where species of milkweed occur and as such are found in disturbed or early plant successional habitat.

Direct and Indirect Impacts
Alternative A
The Proposed Action may result in direct mortality. These activities may also increase suitable habitat through thinning, burning, and road work, which would disturb soil and set back habitat into earlier successional stages in which milkweed may occur. Increased open habitat may provide nectar sources and travel corridors for these habitat generalists. The project would contribute toward achievement of Forest Plan objective 221 by conserving and enhancing monarch habitat.

Alternative B
The No Action alternative would have no immediate effects. Eventually, lack of action could result in loss of some open habitats.

Determination
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** The No Action alternative would have ***no impact.***

Cooper's Rocky Mountain Snail
The Cooper's Rocky Mountain snail is found in moist environments especially spruce and spruce/pine mix, in lowland wooded areas, riparian toe slopes or talus slopes, generally with north to east exposure. This snail is loosely tied to calcareous soils, limestone outcrops and soil conditions. This species forages on decayed deciduous tree leaves and degraded herbaceous vegetation. In suitable habitat, this snail can be found crawling on decaying woody debris (Frest and Johannes 2002). Forest litter is an important habitat component.

Current identified distribution is in the Black Hills of South Dakota and Wyoming. Populations are limited in the Black Hills to suitable habitat mostly in Spearfish Creek, upper reaches of Rapid Creek, Higgins Gulch, Prospect Gulch and Grand Canyon near Deadwood, SD (Frest and Johannes 2002). This species could also be found in other drainages in the northwest region of the Black Hills. Many of the colonies, including most of the largest, are found in ponderosa pine with a partially closed canopy, a secondary deciduous tree component, and diverse understories. At some sites, white spruce was common. Riparian woodland communities, often in areas with adjacent steep rocky slope bases, were also found to contain some substantial colonies.

Management activities that change moisture levels, ground temperature, and amounts of litter and vegetation cover are likely to negatively affect this species. The primary potential threats include road building, fire, timber harvest, mining, grazing, and motorized recreation. (Anderson 2005). Although fire is a natural disturbance, high intensity fire can potentially eliminate snail habitat (Anderson 2005). Forest management, including fire suppression, in the last century has led to fuel buildup, which may promote high intensity fires. Road construction and maintenance

can also affect snails by eliminating habitat or killing snails. Roadside brushing or weed spraying can also damage snails or their habitat (Anderson 2005). Snails often depend on undisturbed forest and riparian habitat, making it especially vulnerable to the effects of habitat degradation and environmental change (Frest and Johannes 2002).

Direct and Indirect Impacts

Alternative A
The Proposed Action may cause direct mortality and change microclimates, damaging or destroying unknown snail colonies. Management of known colonies consistent with Forest Plan standard 3103 would protect microsite conditions and minimize adverse effects on these colonies.

Alternative B
The No Action alternative would have no direct effects. The potential for high-intensity surface fire resulting from existing fuel conditions would remain elevated; this type of wildfire could eliminate snail habitat. Both alternatives would contribute toward achievement of Forest Plan objective 221 by conserving Cooper's Rocky Mountain snail habitat.

Determination
The Proposed Action and the No Action alternative ***may adversely impact individuals, but are not likely to result in a loss of species viability on the Planning Area, nor cause a trend toward federal listing***.

Western bumble bee
The western bumble bees are primitively eusocial insects that live in colonies made up of one queen, female workers and, near the end of the season, reproductive members of the colony (new queens, or gynes, and males). New colonies are initiated by solitary queens, generally in the early spring (Hatfield et al. 2015). The western bumble bee, like most other species of bumble bees, typically nest underground in cavities such as abandoned rodent burrows (Koch et al. 2012) Western bumble bees are generalist foragers (Koch et al 2012) and have been reported visiting a wide variety of flowering plants. Bumble bees require plants that bloom and provide adequate nectar and pollen throughout the colony's life cycle, which is from early February to late November for *B. occidentalis* (although the actual dates likely vary by elevation) (Hatfield et al. 2015).

Western bumble bee populations are experiencing dramatic declines (Koch et al. 2012). This bee is also faced with other stressors including habitat loss and alteration due to agricultural intensification, urban development, conifer encroachment (resulting from fire suppression), grazing, logging and climate change (Hatfield et al. 2015). Insecticides, designed to kill insects directly, and herbicides, which can remove floral resources, both pose serious threats to bumble bees. Of particular concern are neonicotinoids, whose toxins are persistent and accumulate in the nectar and pollen of plants (and thus collected by bees), and have both lethal and sublethal effects on bumble bees (Hatfield et al. 2015).

In forested areas such as the BHNF, bumble bees are commonly found around flowers along streams, in meadows, recently burned or logged area, and along roadsides (Koch et al. 2012).

Direct and Indirect Impacts
Alternative A
The Proposed Action could result in direct mortality of bumble bee eggs, larvae, or adults. Soil-disturbing activities could destroy burrow habitat. Proposed activities would result in conditions favorable for flowering plants, which could provide increased pollen and nectar opportunities. An increase in open habitats may provide additional suitable habitat and travel corridors for these habitat generalists. Neonicotinoid herbicides are not used for noxious weed control on the BHNF. The project would contribute toward achievement of Forest Plan objective 221 by conserving western bumble bee habitat.

Alternative B
The No Action alternative would have no immediate effects. Eventually, lack of action could result in loss of some open habitats.

Determination
The Proposed Action ***may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** The No Action alternative would generally have ***no impact.***

Finescale dace
Finescale dace occur in the Redwater Creek drainage in the Wyoming portion of the project area (Isaak et al. 2003). They seem to do best in standing water habitats, such as beaver ponds. This species has been transplanted to various sites in the BHNF but the only population that persists is upstream of Hemler Reservoir, in ponded habitat near the headwaters of Redwater Creek. The drainage area of this watershed is slightly less than 1,600 acres.

Direct and Indirect Impacts
Alternative A
The Proposed Action would not result in direct mortality because no in-water activities would occur in the headwaters of Redwater Creek. Indirect impacts are usually associated with ground-disturbing activities and occur later in time and/or away from the actual area of disturbance. A more thorough discussion of these effects is included in the watershed section. Proposed ground-disturbing activities have the potential to contribute sediment into waterbodies if surface water flows transport sediment into waterbodies. No new roads are proposed in the finescale dace watershed, so no new road-stream crossings or reconstruction of existing crossings are anticipated. Design features in the form of Forest Plan standards and guidelines, WCPs, and other measures would reduce non- point source water pollution from ground disturbance to levels that maintain water quality standards and fisheries beneficial uses. It is unlikely that proposed vegetation management activities would affect flow regimes to a degree that would have a detectable effect on stream flows or beaver pond levels.

Alternative B
The No Action alternative would not result in direct effects. Indirect effects may include increases in tree biomass; this may increase tree evapotranspiration but the effect would probably be overshadowed by precipitation patterns. Therefore, no discernable effect on flow regimes or finescale dace habitat would occur. Fire hazard and risk of mountain pine beetle infestation may increase over time. Some sediment input may occur from natural erosion processes and other activities but effects on aquatic habitats would be minimal.

Determination
The Proposed Action would have ***no impact.*** The No Action alternative would generally have ***no impact.***

Lake chub
Lake chub occur across Canada and the northern United States. In the Black Hills, lake chub occur in Deerfield Reservoir, which is a 414-acre impoundment on Castle Creek completed in the late 1940s. Historically, lake chub were more widely distributed in the Black Hills. Deerfield Dam and reservoir water levels are regulated by the U.S. Bureau of Reclamation. The South Dakota Department of Game, Fish and Parks (SDGFP) manages fisheries in the reservoir. The lake chub population in Deerfield Reservoir is in decline (USDA Forest Service 2015b). Spawning occurs in the spring in shallow waters over cobble substrates (Isaak et al. 2003). No spawning migrations upstream into Castle Creek or other tributaries to Deerfield Reservoir have been documented.

Direct and Indirect Impacts
Alternative A
The Proposed Action would not cause direct mortality because no in-water activities are proposed in Deerfield Reservoir. Indirect impacts relate to management activities upstream/upslope from Deerfield Reservoir that might affect habitat in the lake. Vegetation treatments upstream of the reservoir would not affect the amount of lake chub habitat because the U.S. Bureau of Reclamation operates the reservoir to maintain a fairly constant pool elevation. Ground-disturbing activities associated with tree removal, prescribed fire, road building, and other activities have the potential to contribute to or mobilize stream sediment. MA 8.2, in which Deerfield Reservoir is located, is excluded from the project area, providing an approximate 3,200-acre buffer area around the lake.

Over five miles of perennial stream feeding into Deerfield Reservoir are also within the excluded area. Implementation of Forest Plan standards and guidelines, WCPs, and project-specific design features would be anticipated to prevent or minimize non-point source water pollution, primarily sediment from ground-disturbing activities, from entering into streams that flow into the reservoir. Therefore, any sediment entering the reservoir from further upstream is unlikely to affect lake chub spawning habitat, prey availability, or water quality.

Alternative B
The No Action alternative would not result in direct mortality. No discernable effect on flow regimes or water yield into Deerfield Reservoir would occur. The US Bureau of Reclamation generally operates Deerfield Reservoir at a fairly constant water level, thereby maintaining the

quantity of lake chub habitat. Fire hazard and risk of mountain pine beetle infestation may increase over time. Aquatic habitats in Deerfield Reservoir would be largely maintained.

Determination
The Proposed Action is predicted to have ***no impact.*** The No Action alternative would generally have ***no impact.***

Mountain sucker
Status of mountain sucker are discussed in the MIS section.

Direct and Indirect Impacts
Alternative A
Direct impacts (physical injury/mortalities) relate to inwater activities, such as culvert installation or repair, at road-stream crossings that may kill or injure mountain suckers. Adult mountain sucker are expected to generally swim away to avoid harm, but eggs or very young fish are more vulnerable. These impacts are largely avoided through a design criteria to minimize inwater construction activities during the mountain sucker spawning season. No new road-stream crossings were identified in relation to streams where mountain sucker are known to occur, but some existing crossings may need to be improved in occupied habitat. **Indirect impacts** include those effects that occur later in time or distance from the point of impact. The reconstruction of existing road-stream crossings may have the indirect benefit of improving fish passage and stream connectivity if the existing culvert being replaced is a barrier to fish passage. Other indirect affects generally relate to ground-disturbing activities that have the potential to add sediment to the stream network or impact streambank stability or degrade riparian habitat. Increased sediment delivery to streams, whatever the source, tends to result in less diverse physical habitats, decreases water quality, denudes spawning substrates, and decreases the availability of deep pools (Isaak et al. 2003).

Roads that either cross streams or are in close proximity to streams have the greatest potential to add sediment to streams. Assuming that all of the 18 miles of new/temporary road construction proposed would include routes near water, which is likely an overestimate of the potential effects, about half of that mileage would be within the AMZ (100 feet buffer) of intermittent or perennial streams. The mileage of new roads within the AMZ is comprised of nearly 100 separate segments that on average are individually less than 0.1 mile long. Only eight new road segments are longer than 0.25 mile. The longest individual new road segment is 0.7 mile long near an intermittent stream near the Teepee Work Center where no fisheries would be directly or indirectly affected. Approximately 35 percent of the miles of new and temporary roads are within the AMZ of perennial streams, the remainder are along intermittent streams, which reduces the potential for negative effects to fisheries.

These road-related impacts are further mitigated through the implementation of Forest Plan standards and guidelines, watershed conservation practices and design criteria that ensure non-point source water pollution is controlled at levels that maintain water quality standards and fisheries beneficial uses.

Some indirect effects are expected to be beneficial. A more resilient landscape is likely to reduce the adverse effects due to high severity wildfire impacting aquatic habitat at a watershed scale,

though mountain sucker have persisted in the disturbance ecology of the Black Hills. The Watershed Report in the Project Record has additional analysis of potential effects to aquatic resources.

Alternative B

Direct impacts (physical injury/mortalities) could occur similar to Alternative A, due to similar inwater construction activities related to road-stream crossing construction or replacement that may occur under this alternative. **Indirect impacts** are similar under this alternative because many of the same activities are either ongoing or likely to occur though the acres treated is likely to be less. The same mitigation would be applied under this alternative as the proposed action to maintain aquatic habitat and avoid impacts to the mountain sucker.

Determination

The Proposed Action and No Action alternative ***may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.*** Species-specific determinations are summarized below.

Determination Summary by Alternative for Analyzed Species

Species	Alternative A (proposed action)	Alternative B (no action)
American peregrine falcon	NI[1]	NI
Bald eagle	MAII[3]	NI
Northern goshawk	MAII	MAII
Northern harrier	BI[2]	NI
Burrowing owl	NI	NI
Flammulated owl	MAII	NI
Lewis' woodpecker	MAII	MAII
Black-backed woodpecker	MAII	NI
Grasshopper sparrow	MAII	NI
Loggerhead shrike	NI	NI
Long-billed curlew	NI	NI
Yellow-billed cuckoo	MAII	MAII
Fringed myotis	MAII	NI
Townsend's big-eared bat	MAII	NI
Hoary bat	MAII	NI
American marten	MAII	NI
Rocky Mountain bighorn sheep	MAII	NI
Black-tailed prairie dog	NI	NI
Northern leopard frog	MAII	MAII
Black Hills redbelly snake	MAII	MAII
Regal fritillary	NI	NI
Monarch butterfly	MAII	NI
Cooper's Rocky Mountainsnail	MAII	MAII
Western bumble bee	MAII	NI
Finescale dace	NI	NI
Lake chub	NI	NI
Mountain sucker	MAII	MAII

1 - No Impact

2 - Beneficial Impact
3 - 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.

Cumulative Impacts

Cumulative impacts are additive incremental impacts from the action alternative in relation to past, present and reasonably foreseeable future actions. Past actions are reflected in the existing condition. The cumulative effects analysis area for wildlife includes the breeding territory or home range of each species. These vary widely in size and may include non-NFS lands, including those outside the BHNF boundary. This analysis is bounded (except for deer, elk and raptors) by the Forest Boundary. Relevant actions on federal and non-federal land assessed in the project area (or 5 mile buffer adjacent to project area for deer and elk) are discussed below.

No large-scale land use changes are currently foreseen. Therefore, this analysis primarily considers cumulative effects related to activities on NFS lands. The timespan for cumulative effects analysis is the present through 2038, or 10 years after the probable completion of proposed activities. By this time, it is likely that the project's effects on wildlife species and habitat would become difficult to distinguish from those of other activities and events.

Fire suppression will continue to allow fuel accumulation, increases in pine stand density, and encroachment of pine into other vegetation communities. Timber sales have reduced pine stand density and the number of large trees and snags. Post-sale activities and prescribed fire are also generally expected to reduce pine stand density. Proposed prescribed fire and removal of conifers from aspen are likely to promote fire resistance and non-conifer vegetation communities. Proposed construction of new roads would increase the amount of wildlife habitat lost or modified due to roads. Disturbance to wildlife from motor vehicle use generally ends after the roads are rehabilitated or closed to public use, though increased habitat fragmentation may persist. Residential development of private lands has displaced some species and altered habitats. Post-wildfire salvage in the BHNF has been limited because the timber must be removed almost immediately or value is lost due to wood-boring insects. Other constraints, such as steep slopes and watershed protection measures, have also limited salvage. Any post-fire salvage that occurs in the reasonably foreseeable future would follow the *Post-Wildfire Forest Plan Implementation Guidance* (USDA Forest Service 2017) associated with meeting Forest Plan objective 11-03. Through this objective, the BHNF strives to provide recently burned habitat for species, in particular the black- backed woodpecker, that are associated with post-fire conditions while allowing some removal of damaged trees for commercial or safety reasons. The top priority for retention is moderate/ high- severity burned pine stands that were dense, mature forest prior to burning.

The Proposed Action would add to the above effects of timber sales, prescribed fire, removal of conifers from aspen, and road construction. It would reduce acreage of dense, mature forest as compared to the No Action alternative through construction of shaded fuel breaks. It would also reduce the number of large trees and snags (through hazard tree removal), though efforts to retain some of the denser canopy open, mature pine stands so that they may increase in density, and the designation of some open, mature stands as late succession, would have a positive effect. Because the additive effects would remain within or trend toward Forest Plan desired conditions, these changes would not threaten the persistence of any species in the BHNF. The Proposed

Action would not authorize post-wildfire salvage, though some treatment of burned habitat could occur if live trees in a harvest unit/treatment area that was already under contract are subsequently burned before treatment activities are completed.

Streams and lakes on the BHNF provide opportunities for water dependent activities, such as fishing, swimming and boating, as well as habitat for a variety of fish and wildlife species. The implementation of BHRL activities is not expected to have a cumulative effect on recreational fishing opportunities nor compromise native fish conservation. No additive stream fragmentation is predicted because all new instream structures, primarily culverts at road-stream crossings, will allow for the passage of aquatic organisms. The activities proposed under Alternative A are not likely to introduce or spread aquatic invasive species. Ground disturbing activities may result in an incremental increase in sediment input that is additive to natural erosion processes and other ongoing activities. The implementation of Forest Plan standards/guidelines, watershed conservation practices and design criteria to address non-point source water pollution, primarily sediment, is expected to maintain assigned fisheries beneficial uses and meet water quality standards. These and other proposed activities may result in minor, temporary increases in streamflow or water yield, but they are likely to be overshadowed by precipitation patterns (wet vs drought cycles). Reconstruction at existing road-stream crossings that are barriers to aquatic organism passage would have a positive cumulative effect in improving stream connectivity within those affected watersheds.

Climate Change

The agency's "Strategic Framework for Responding to Climate Change" (USDA-Forest Service 2008) provides direction to guide future management and research to address climate change in all aspects of agency work. The BHNF therefore, has direction to actively manage fish and wildlife habitat considering climate change.

Climate change could lead to the loss of native species from extensive areas and result in increasingly scarce and fragmented populations in many others. Further changes within ecosystems could be triggered as invasive plant and animal species become established as native species are lost (Burns 2012). Due to generally accepted climate warming scenarios, disturbances such as fire, insects, and disease are predicted to increase and may accelerate establishment of invasive species. Some wildlife species would benefit from increased wildfires. Other wildlife species could experience decreased habitat or extirpations as vegetation composition changes and further destabilize ecosystems. Until potential changes are better understood, it would be difficult to predict the environmental outcomes of forest management activities related to climate change (Ruggiero et al. 2008, Reid and Lisle 2008). In any climate change scenario, there will likely be wildlife species that will benefit and others that will be harmed from changes.

The potential impacts to species on the Forest are becoming better understood and effects of any one project are not meaningfully measurable, especially at the scale of the project area (Burns 2012). However certain generalizations can be made. Implementation of management activities will require large quantities of fossil fuels when compared to the no action alternative. Secondly, in active management, large amounts of live tree biomass will be removed from the BHNF.

If there is a relatively equal exchange of Carbon from either alternative through time, added fossil fuel consumption from implementing the BHRL project activities for the next 10 years would add greenhouse gas emissions into the atmosphere and an additional cost toward increased climate change compared to the no action alternative.

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