APPENDIX C:

Biological Assessment / Biological Evaluation

PHASE II AMENDMENT
BLACK HILLS NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN

BIOLOGICAL ASSESSMENT

THREATENED AND ENDANGERED SPECIES

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1-0. INTRODUCTION

The U.S. Department of Agriculture (USDA)-Forest Service is proposing to amend the 1997 Land and Resource Management Plan (LRMP) for the Black Hills National Forest (the Forest).

An LRMP creates a framework for decision making on Forest managment. On August 19, 1983, the Regional Forester for Region 2 (Region 2), the Rocky Mountain Region of the USDA-Forest Service, approved the original LRMP for the Forest. Subsequently, new information and regulations were incorporated in a revision and released in 1996 as the Revised LRMP for the Forest. The revisions were evaluated under the National Environmental Policy Act (NEPA) in a 1996 environmental impact statement (EIS). In 1997, errata, a revised reference list, and letters received since the Final EIS release were presented in the 1997 Revised LRMP Final EIS Addendum. A Record of Decision (ROD) was signed for the Revised LRMP Final EIS and Addendum, establishing the 1997 Revised LRMP as the new Forest guidance. The 1997 Revised LRMP and its Appendices; the Final EIS for the 1997 Revised LRMP including a revised biological assessment/biological evaluation (BA/BE) in Appendix H; the Final EIS Addendum and ROD; and the associated Planning Record are incorporated in this document by reference.

A number of groups and individuals submitted appeals of the Regional Forester's decision. On October 12, 1999, Deputy Chief James R. Furnish, the Reviewing Officer for the Chief of the USDA-Forest Service, issued his decision on three of the appeals in the 1999 Appeal Decision. His decision affirmed the Regional Forester's June 24, 1997 decision with instruction for further actions concerning, in part, the issues relating to species viability and diversity.

The 1999 Appeal Decision identified interim direction that required the Forest to avoid management actions that could adversely affect species viability and diversity pending revision of the 1997 Revised LRMP. The USDA-Forest Service developed an Action Plan to implement instructions for further action in the 1999 Appeal Decision. The Action Plan schedule set forth required adjustments to the 1997 Revised LRMP in two phases: a short-term, interim Phase I and a long-term, comprehensive Phase II.

The Phase I effort was completed on May 18, 2001 and included an amendment to the 1997 Revised LRMP for the short term (two to five years). The Phase I Amendment addressed certain deficiencies in the 1997 Revised LRMP as identified in the 1999 Appeal Decision.

The Phase I Amendment incorporated new and updated monitoring protocols into the 1997 Revised LRMP Monitoring Implementation Guide for sensitive species survey and monitoring; streambank monitoring; and evaluation of the effectiveness of Best Management Practices (BMP) for the Prevention of Non-Point Source Pollution. The Forest Service Manual (FSM) provides direction that will continue to be followed for management indicator species (MIS) at FSM 2621 and sensitive species at FSM 2670. Adoption of this direction ensured that actions taken during the next two-to- five years would not foreclose future management options concerning species viability and diversity and that adequate habitat would be maintained on the Forest for species for which there may be a viability concern. This approach allowed the Forest to proceed with management actions until completion of the more comprehensive Phase II Amendment while minimizing risk for these species.

Shortly after the Chief's Appeal Decision in November 1999, several individuals and groups filed suit against the Forest Service to block implementation of the Veteran Salvage Timber Sale within the Beaver Park Roadless Area. The lawsuit cited several of the deficiencies identified in the Chief's Appeal Decision and claimed Forest Plan direction was inadequate to protect certain resources in the timber sale area. Negotiations were initiated to settle the lawsuit, and in September 2000 a Settlement Agreement (the Settlement) was signed and issued by the parties (Civil Action 99-N-2173, US District Court for the District of Colorado 2000). In signing the Settlement, the Forest agreed to undertake the Phase I and Phase II Forest Plan amendments. Further, the Forest agreed to consider several specific items in the Phase II effort including the analysis of research natural areas (RNAs) and further evaluation of the viability of management indicator species (MIS) and the northern goshawk.

In August 2000 the Jasper Fire started west of Jewel Cave National Monument on Forest-administered lands. By the time the fire was controlled in mid-September it had burned over 83,000 acres of National Forest System (NFS) lands. The Jasper Fire occurred during one of the worst fire seasons in history nationally and during a time of prolonged drought conditions on the Forest. The national events of the 2000 fire season led to the development of the National Fire Plan (NFP), a large-scale policy initiative to address hazardous fuel conditions on forest and rangelands nationwide.

Since that time several large fires have occurred on the Forest. In addition, a mountain pine beetle (MPB) outbreak that began in the late 1990s in the Beaver Park area has grown to epidemic proportions and is affecting several areas of the Forest. The Forest has initiated a number of projects to aggressively address insect hazard and Forest fuel conditions, both of which have been exacerbated by continued drought. The implementation of at least one of these projects required non-significant amendments to Forest Plan direction.

Phase II of the Action Plan was initiated to implement instructions for further action in the 1999 Appeal Decision and to re-evaluate the sufficiency of the 1997 Revised LRMP in relation to species viability and diversity. The analysis in this Final EIS builds on the information developed by the Forest's 1997 Revised LRMP Final EIS and the Phase I Amendment analysis. It determines what, if any, level of amendment to the 1997 Revised LRMP or Forest policy is necessary. The Forest published a Notice of Intent (NOI) to prepare an EIS for the LRMP Phase II Amendment on November 28, 2001 (66 FR 59406).

2-0. PROJECT DESCRIPTION

2-1. PURPOSE AND NEED

Under the proposed action, the 1997 Revised LRMP would be amended. The LRMP sets programmatic direction and creates a framework for project-level decision making and compliance with federal environmental policies. This Final EIS addresses the general effects of implementing this programmatic direction. It does not speak directly to the effects that might arise from site-specific or project-specific implementations of that direction.

- The purpose for the proposed action is to address deficiencies in the 1997 Revised LRMP as identified in the 1999 Appeal Decision; to address related requirements of the 2000 Settlement Agreement; and to address Forest health needs that have changed from those analyzed in the EIS for the 1997 LRMP.

2-1. AREA AFFECTED BY THE PROPOSED ACTION

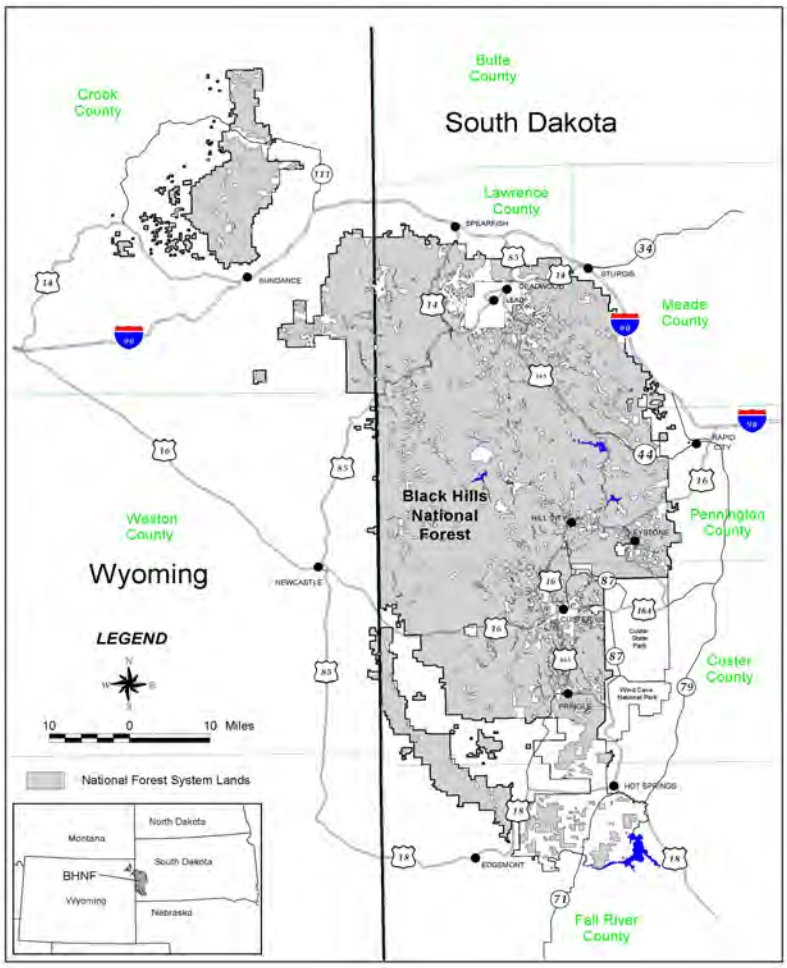
The Black Hills National Forest is located in western South Dakota and northeastern Wyoming. Portions of the Forest occur within five counties of South Dakota (Custer, Fall River, Lawrence, Meade, and Pennington) and two counties of Wyoming (Crook and Weston). The 1.2 million-acre Forest includes most of the Black Hills and a disjunct range in Wyoming, the Bearlodge Mountains.

Four major ecosystem types occur on the Forest: Forested Ecosystems, including ponderosa pine, white spruce, and hardwoods; Grassland/Shrubland Ecosystems; Riparian/Wetland Ecosystems; and Aquatic Ecosystems, including streams and reservoirs. Ponderosa pine makes up the largest community type in the Forest, with grasslands, hardwoods, and white spruce following in descending order. Aquatic habitat (excluding stream miles) and riparian habitat each make up less than one percent of the entire Forest area. The spatial distribution of ecosystems within the Black Hills is a result of interrelated factors including physiography, geology, climate, soils, and land use (Shepperd and Battaglia 2002; USDA-Forest Service 1996). The variety of ecosystem types and the plant communities within them provide for a diversity of wildlife in the Forest.

Early accounts of the Black Hills document that ponderosa-pine coverage was widespread but also noted that its extent was limited by disturbance (Parrish et. al 1996). Natural disturbance activities included beaver activity, weather events (i.e., wind, snow, lightning, and hail), insects, disease, and fire (Shepperd and Battaglia 2002). Prior to settlement, hardwood, herbaceous, and shrub communities were more abundant and diverse while pine and spruce communities were less extensive (USDA-Forest Service 1996).

Fire suppression and forest management began in the early 20th century, causing a shift in the abundance and makeup of different habitats within the Forest. Deciduous forests, riparian areas, shrublands, and grasslands were reduced and eventually converted to ponderosa pine while the density and canopy cover of ponderosa-pine forests increased (Uresk and Severson 1998). Other activities such as logging, road construction, livestock use, mining, recreation, tourism, and development on federal, state, and private lands have all contributed to changes throughout the Forest ecosystems.

Black Hills National Forest Planning Area



2-2. PROPOSED ACTION (ALTERNATIVE 6)

The proposed action would manage for an increase of moderate-to-low fire-and-insect hazard rating except in the Black Elk Wilderness; the Norbeck Wildlife Preserve; Peter Norbeck Scenic Byway; Management Area 3.1 (BAs); Management Area 3.7 (late- successional Forest landscapes); and in existing and candidate RNAs. Restoration of aspen and conversion from conifers to less flammable cover types such as other hardwoods, riparian, and meadows would be emphasized. This alternative includes 4 candidate RNAs that represent a majority of the target vegetation types of the RNA assessment.

2-2.1. Species Viability

- Objective 201 manages for a minimum of 92,000 acres of aspen (double current aspen acres), and 16,000 acres of bur oak (approximately 33 percent increase) during the life of the Plan. The highest priority for hardwood restoration is where conifers (e.g., spruce and

pine) have out-competed aspen adjacent to riparian systems that once supported beaver. Increases in bur oak will be focused away from the Bear Lodge Mountains where bur oak is already plentiful.

- Objective 205 manages for 122,000 acres of prairie grassland and 3,600 acres of meadow during the life of the Plan. Restored acres will not be considered suitable for timber production.
- Objective 214 would increase riparian shrub-community restoration by 500 acres across the Forest during the Plan period on sites capable of supporting this community.
- Management area objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 (the structural stage objectives) would manage for the following percentages of structural stages in ponderosa pine across the landscape in a diversity of sizes and shapes. Alternative 6 structural stage objectives when compared to Alternative 3 structural stage objectives add an understory shrub component and provide for a more open forest compatible with reduced fire and insect hazard.
    - SS1 -5%
    - SS2 -5%
    - SS 3A -10%
    - SS 3B -15%
    - SS 3C -5%
    - SS 4A -25%*
    - SS 4B -25%*
    - SS 4C -5%*
    - SS 5 -5%
    - *10% of the structural stage 4 ponderosa pine acreage in the management area will have a tree size of very large. This feature, combined with SS 5, provide a little over 10% of managed stands in the very large tree size. Seek opportunities to increase understory shrubs in open-canopy structural stages. Active management is allowed, and may be necessary, to provide desired late-successional characteristics in structural stage 5.
- Objective 200-01 would manage for 20,000 acres of spruce across the Forest using active management to achieve multiple use objectives. Spruce may be treated within 200 feet buildings, where spruce has encroached into hardwoods, and for emphasis species management.
- Objective 200-09 manages for 200 to 300 acres of prairie dog towns on the Forest in at least 3 colonies.

Standards and guidelines ralating to listed species:

- Standard 3101 provides direction for bald eagles:

- Organochlorine pesticides will not be used as chemical agents on the Black Hills National Forest.

- Prohibit new disturbances, not existing at the time of bald eagle nest initiation that may detrimentally influence nest success, within 1 mile of bald eagle nests during the nesting season (February 1 through September 1). The distance may be reduced where forest characteristics or topography reduce the line-of-site distance from the nest, based on site-specific analysis.

- Protect traditional communal bald eagle winter roost sites. Restrict activities that may disturb bald eagles within 1 mile of communal roosting areas from November 1 through April 1.

- In stands being used by bald eagles on a transitory basis, avoid timber harvest activities when in use. Harvest may resume when birds have vacated the stands.

- Standard 3204 protects known raptor nests.

- Standard 8308 requires the replacement or reconfiguration of unsafe power line poles with raptor safe designs as soon as possible in areas with identified raptor electrocution problems.

- Standard 8309 requires raptor protections for new electric lines and pole construction.

2-2.1. Research Natural Areas

Four candidate RNAs, Canyon City, Fanny/Boles, Geis Spring, and North Fork Castle Creek, are included in this alternative along with the existing Upper Pine Creek RNA. The candidate RNA assessment process focused on providing conservation for targeted plant series. Alternative 6 would provide bur-oak, mountain mahogany/skunkbrush, eastern Hophornbeam/ironwood, riparian shrubland, ponderosa pine, montane-willow, and white-spruce conservation.

Candidate RNAs would be subject to Standard 2.2-1001 that requires maintaining and/or enhancing the character and ecological values for which the candidate RNAs have been identified and to Standard 2.2-2501 that prohibits the increase in domestic livestock animal unit months (AUMs) prior to designation.

Designated RNAs would be subject to 11 standards and five guidelines. These standards (2.2-1501, 2.2-2401, 2.2-4101, 2.2-4102, 2.2-4103, 2.2-5201, 2.2-5401, 2.2-8301, 2.2-9101, and 2.2-9102) would prevent mineral entry, timber harvest, mechanized or motorized use, the collection of special forest products, and may require restricted public access. Restricting public access may include obliterating closed roads, or in extreme cases, closing an RNA or a portion of it to any public use. The standards would also require the obliteration of existing roads and the use of minimum impact suppression techniques (MIST) in suppressing wildfire. Guidelines (2.2-1002, 2.2-4201, 2.2-5101, 2.2-5202, and 2.2-5601) would allow uses that would maintain or improve the ecological values for which the RNA was designated, subject to monitoring. Should

monitoring reveal that a use causes adverse effects on the ecological values for which the RNA were designated, that use would be limited or prohibited.

2-2.2. Fire-and-Insect Hazard

Fire-and-insect hazard management is an important feature, and objectives reflect the difference in approach of this alternative.

- Objective 10-01. Would manage for 50 to 75 percent moderate-to-low fire hazard in the WUI and reduce fire hazard within proximity of structures to current NFPA standards except in Management Areas 1.1 Black Elk Wilderness, 2.2 Research Natural Areas, 3.1 Botanical Areas, 4.2B Peter Norbeck Scenic Byway, and 5.4A Norbeck Wildlife Preserve. Manage the remainder of the Forest for 50 percent moderate-to-low fire hazard except in Management Areas 1.1 Black Elk Wilderness, 2.2 Research Natural Areas, 3.1 Botanical Areas, 3.7 Late-successional Forest Landscapes, 4.2B Peter Norbeck Scenic Byway, and 5.4A Norbeck Wildlife Preserve.
- Objective 10-03. Within five years of a formal research natural area (RNA) designation, manage for a moderate-to-low-fire hazard between RNAs and at-risk communities and other resources as needed where the topography, wind conditions, and fuels could create the potential for wildfire spread to the at-risk community or resource (e.g., sensitive plants, heritage resources, etc.), except those designated in Management Area 1.1 Black Elk Wilderness.

Four new objectives are added under Goal 11:

- Objective 11-01 achieves a nonemergency watershed condition (See FSH 2509.13) as soon after an event as possible, but generally no later than three to five years.
- Objective 11-02 achieves a fuel-loading mosaic within three to five years of an event, with reassessment as conditions change over time.
- Objective 11-03 indicates following a wildfire, dead trees will be available for value recovery. Retain 50 percent of the recent (0-5 years) stand-replacing fire acreage up to 10,000 acres Forest-wide. Generally the highest priority areas to retain are those with greater than 70 percent pre-fire canopy closure. The following will be included in determining if the 10,000-acre figure has been met: stand-replacing fire and associated out-year fire/insect mortality, and relatively large blocks of stand-replacing insect outbreaks that can be combined into 1,000-acre areas.
- Objective 11-04 provides for shrub establishment in moderate-to-high-intensity burn areas during the first five years following a wildfire.

3-0. SPECIES CONSIDERED IN THIS ANALYSIS

3-2.1. General Discussion

The following table includes threatened, endangered, and proposed species located on the Black Hills National Forest or located adjacent to or downstream of the project area that could potentially be affected. These species were identified through informal consultation with the South Dakota and Wyoming Field Offices of the US Fish and Wildlife Service (USFWS). The only candidate species, *Botrychium lineare*, is discussed under the Biological Evaluation for Region 2 sensitive species.

Table C-1. Federally Endangered, Threatened, and Proposed Species Potentially Occurring on the Planning Area

Scientific Name	Common Name	Status	Expected Occurrence BHNF	Suitable habitat present?	Species Needs to be carried forward in Analysis
Haliaeetus leucocephalus	Bald Eagle	Threatened	Documented winter use	Yes, Winter habitat; Potential nesting habitat	Yes
Mustela nigripes	Black-footed Ferret	Endangered	Possible	Potentially suitable	Yes
Canis lupus	Gray Wolf	Nonessential / Experimental(WY) Threatened (SD)	Isolated record, Unlikely	Yes	Yes

3-2.1.

Biological Assessment Process

A pre-field review was conducted of available information to assemble occurrence records and describe habitat needs and ecological requirements for each federally listed and proposed species. Sources of information included Forest Service records and files; South Dakota Natural Heritage Program database; Wyoming Natural Diversity database; the South Dakota Department of Game, Fish and Parks (SDGFP); the Wyoming Game and Fish Department; and published research (citations). This information served as the basis for determining the effects of the alternatives.

Field reconnaissance has continued since the Phase I Forest Plan Amendment Supplement to the Forest Plan BA/BE (USDA-Forest Service 2001). The information gathered from these surveys distinguished location and habitat associations for relevant species and helped to determine effects of alternatives. The Forest also used publications based on field work conducted by other parties in the Black Hills.

The analysis of potential effects on federally listed and proposed species was conducted using data gathered in the pre-field review and field reconnaissance on the habitat requirements and potential limits to persistence on the Forest for each species. The habitat requirements and potential limits to persistence for each species were then used to determine the effect of relevant

Forest objectives and standards and the likelihood of long-term persistence of each species. The risks-to-species persistence on the Forest was compared by alternative. Determinations were made based on the anticipated effects to a species and its habitat (e.g., direct, indirect, and cumulative). The determination language is set forth in Forest Service Manual (FSM) 2670 and by the U.S. Fish and Wildlife Service (1998) Section 7 Handbook. In general, determinations of effect include positive, negative, no effect, and not applicable for relevant objectives and standards.

Determinations for each species are made as a result of the information gathered during the pre-field review, field reconnaissance, and effects analysis. The basis for each determination is potential habitat, expected occurrence, distribution, effects from Forest activities, and proposed mitigation used to alleviate the potential effects resulting from Forest-management activities. The rationale for each determination is supported by citations, and trade-offs are discussed.

3-2.2. Critical Habitat

No critical habitat designated by the Secretary of the Interior or Commerce for the survival and recovery of listed species (50 CFR Parts 17 and 226) is presently located on lands administered by the Black Hills National Forest.

3-2.3. Consultation History

Preliminary scoping comments on the Phase II LRMP were received from the USFWS-Wyoming Field Office (WFO) 24 January 2002, including a species list for the project (Long 2002a). Three additional species lists were received by the the Forest from the WFO during the consultation period but were not specifically part of the scoping for Phase II LRMP (Long 2002b, Long 2002c, Long 2003). The procedure for obtaining a species list from the USFWS-South Dakota Field Office (SDFO) is to obtain a current list from their websites for listed and candidate species by county (US Fish and Wildlife Service 2005,), which was accessed June 13, 2005.

The Northeastern Wyoming Level One Team Meeting of 3 May 2002 discussed preliminary work on the Phase II LRMP (Anonymous 2002a). The Northeastern Wyoming Level One Team Meeting of November 26, 2002 discussed the Phase II LRMP, including current species lists, migratory birds, black-tailed prairie dogs, raptors, and sagebrush/grassland resources (Anonymous 2002b). The US Fish and Wildlife Service/Black Hills National Forest Coordination Meeting of January 16, 2003 confirmed the January 24, 2002 species list from Wyoming as accurate for this project. *Spiranthes diluvitalis* (Ute's ladies tresses) was added to the WFO list in a March 18, 2002 WFO letter (Long 2002c). After receiving documentation from the Forest Service on Ute's ladies tresses, USFWS stated that no further consideration was needed for this species (Rogers 2003).

The least tern, whooping crane, and American burying beetle are on the South Dakota species list; however, these species are not found on the Forest, and key habitat components are not found on the Forest. Subsequent correspondence and SDFO concurrence dropped these three species from the Phase II analysis (Twiss 2003). Although wolves were on the original WFO species list (24 January 2002), subsequent lists did not contain the wolf (1 February 2002, 18

March 2002, 12 February 2003). During the January 16, 2003 meeting, it was determined that wolves in Wyoming would be analyzed as an experimental nonessential population.

A phone conversation between Kerry Burns, wildlife biologist for the Forest, and Brad Rogers of the WFO (2 April 2004) and follow-up e-mail (Burns 2004) confirmed the species list for Wyoming.. On April 30, 2004, a corrected list of endangered, threatened, and candidate species was received from the Wyoming Field Office. The most recent list of species from the Wyoming Field Office was received on April 7, 2005. On June 13, 2005, an updated species list was obtained from the SDFO website (US Fish and Wildlife Service 2005).

4-0. ANALYSIS OF EFFECTS - FEDERALLY LISTED AND PROPOSED SPECIES

4-1. SPECIES DESCRIPTIONS AND EFFECTS ANALYSIS

This section contains the distribution and status, natural history and habitat use, direct and indirect effects, cumulative effects, resource conservation measures, and determination and rationale for threatened, endangered, and proposed species.

4-1.1. Bald Eagle

The 1996 Final Environmental Impact Statement (EIS) Biological Assessment/Biological Evaluation (BA/BE) (USDA-Forest Service 1996 Appendix H) gives an overview of distribution and life history for the bald eagle, and is incorporated here by reference.

Bald eagles are present in the Black Hills during winter, usually arriving in early November (USDA-Forest Service 1996 Appendix H) and leaving by March or April. The bald eagle was formerly a rare breeder in the southeastern portion of South Dakota (South Dakota Ornithologist's Union 1991). In 1993, the first successful bald eagle nesting attempt in South Dakota in over a century was documented (South Dakota Department of Agriculture 2004). As of April 2004, there were 32 active bald eagle nests in South Dakota or on the Nebraska side of the Missouri River along the shared river boundary (South Dakota Department of Game, Fish and Parks 2004). Forest personnel record observations of bald eagles, including nesting activity. No nesting has been documented on the Forest, but an unsuccessful nesting attempt was reported adjacent to the Forest in the Southern Hills in spring 2004. (Staab 2004, pers. comm.). Most suitable nesting habitat occurs around the major reservoirs or along major creeks in the Black Hill. In Wyoming, the bald eagle is an uncommon resident that nests in the western, north central, and southwestern portion of the state (Luce et al. 1999).

The bald eagle is currently listed as federally threatened. In July 1999, the USFWS proposed to delist the bald eagle in the lower 48 states; a final decision is pending.

Key winter habitat components for the bald eagle on the Forest include perch sites, roost sites away from human disturbance, and an adequate food supply (USDA-Forest Service 1996

Appendix H). The Forest has done no formal roost site surveys, but Forest personnel cover the Forest in the course of other duties. Bald eagle concentrations are also of public interest and would likely be reported by Forest users. There are no known traditional roost sites in the Black Hills, but the ponderosa pine landscape, particularly structural stages 4A, 4B, and 5, with up to 70 percent canopy closure, provides suitable roosting habitat (USDA-Forest Service 1996 Appendix H). The environmental baseline is further described in the Forested Ecosystems section in Chapter 3 of the FEIS.

Large concentrations of wintering eagles are not expected to occur on the Forest due to the winter freezing of reservoirs, but a small population of eagles does winter on the Black Hills. This small population appears to rely mainly on a dependable supply of carrion, especially deer and small mammals killed by vehicle traffic. Bald eagles are frequently observed feeding on carcasses along roads (USDA-Forest Service 1996 Appendix H). There is no bald eagle critical habitat delineated by the USFWS on the Forest.

4-1.1.1 Direct and Indirect Effects

Potential impacts from Forest activities could include disturbance at roost or nest sites, changes in prey availability, and impacts to forested habitats used for roosting, nesting, and perching. Power line electrocution also has the potential to affect bald eagles.

Direct effects to this species are not anticipated. No bald eagles currently nest on the Forest. In the event of future nesting on the Forest, the death or injury of adults, eggs or young during the breeding season is unlikely because of protective measures and the low probability of a nest tree inadvertently being felled, given this species high visibility. Standard 3101 prohibits the use of organochlorine pesticides that may indirectly result in eggshell thinning. Standard 3101 avoids harassment by prohibiting new disturbance that may affect nesting success. Standard 3204 protects known raptor nests. Protective dates and distance in Standard 3101 are based on US Fish and Wildlife Service (1999) Guidelines and Wyoming dates for raptor protection.

The proposed action has conservation measures to avoid adverse effects due to overhead transmission lines. Guideline 8303 advises that new or reconstructed electrical utility lines (<33 kilovolt) be buried when feasible. Standard 8308 is modified to require the replacement or reconfiguration with raptor safe designs as soon as possible in areas with identified raptor electrocution problems. Standard 8309 requires raptor protections for new electric lines and pole construction. The best guidance on raptor-safe practices is contained in the Avian Power Line Interaction Committee's (1996) *Suggested Practices for Raptor Protection on Power Lines*. No bald eagle electrocutions resulting from overhead transmission lines have been recorded on the Forest.

Ponderosa pine is the dominant cover type on the Forest; therefore, the following analysis focuses on bald eagle habitat parameters within ponderosa pine forests. Total potential roosting habitat, defined here as ponderosa pine forests in structural stages 4A, 4B, and 5; may decline. However, potential roosting habitat will likely remain above 500,000 acres for all alternatives. Vegetation treatments around large reservoirs such as Pactola, Sheridan and Deerfield, emphasize scenic values that retain large trees for aesthetic reasons limiting the loss of perch or roost trees.

The quantity of bald eagle roosting habitat on the Forest does not appear to be a limiting factor in the proposed action.

Vehicle-killed wildlife is a major food source for wintering bald eagles on the Forest. In general, vehicular collisions with deer are highest on state or federal roads and provide the bulk of carrion upon which eagles feed. Highways where deer carcasses are common have abundant roosting habitat in close proximity. Only in areas where highways cross interior prairies is potential roosting and perching habitat not adjacent to high volume highways. Differences or changes in vehicle traffic are expected to be negligible.

Vegetation management activities may disrupt bald eagles at perch or resting sites. Treatments near the WUI have a greater potential to affect the bald eagle because the WUI generally includes or is adjacent to riparian/aquatic habitat that attracts bald eagles. Human activities or dwellings within the WUI may limit the use of these areas by bald eagles. Impacts to wintering bald eagles are minimized by Standard 3101which avoids timber harvest activities in stands being used by bald eagles on a transitory basis.

4-1.1.2 Cumulative Effects

Management in the national and state parks within or adjacent to the Forest would have little cumulative effect on wintering bald eagles because habitat conditions on these lands are less subject to modification from commodity production or extraction. Suitable roost trees exist on private in holdings, National Park Service lands and Custer State Park to supplement the number of roost trees on the Forest. Human activity may limit roosting on some of these non-NFS lands. There are no known future state, tribal, or private actions considered “reasonably certain to occur” that may affect bald eagles in the Black Hills.

4-1.1.3 Determination and Rationale

May affect, not likely to adversely affect. No direct effects to the species are anticipated. Indirect effects to the species will be negligible because an adequate amount of roosting habitat will be maintained. In addition, there are specific Forest-wide objectives, standards, and guidelines designed to conserve and maintain habitat suitable for nesting. Prey species and availability are likely to be maintained at current levels.

4-1.2. Black-Footed Ferret

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

Black-footed ferrets are federally endangered throughout their former range. In Wyoming, there are historic records of ferrets in the Black Hills area (Luce et al. 1999). The closest known population of ferrets in Wyoming is part of a reintroduction program in the central portion of the state. The black-footed ferret was extirpated from South Dakota and has been reintroduced to the Badlands National Park and Buffalo Gap National Grasslands east of the Black Hills

The black-footed ferret is a nocturnal, solitary carnivore with the narrowest range of ecological tolerance of any North American predatory mammal (USDA-Forest Service 1996 Appendix H). 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), its primary food source. Vacated prairie dog burrows also provide shelter.

Based on 2003 monitoring data, the Forest currently has approximately 265 acres of occupied black-tailed prairie dog habitat, consisting of 5 active colonies, the largest being 151 acres (USDA Forest Service 2003). The three largest towns total 256 acres. The two remaining towns are small and extensions of towns on private lands. The 2003 acreage represents a 20 percent increase over the estimated acreage of 222 acres in 2002, and a 260 percent increase from observations in 1992 (USDA Forest Service 2004). 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 1000 acres) of potentially suitable prairie dog habitat are not present on the Forest.

Previous BA/BE documents for the Forest (USDA-Forest Service 1996 Appendix H, 2001a) discuss the acreage of prairie dog colonies recommended to support black-footed ferret reintroduction programs. These reports conclude that since acreage of prairie dog colonies on the Forest are too small to support reintroduction of black-footed ferrets; they are inadequate to support a population of ferrets. To date, the Black Hills has not been high on the priority list for ferret reintroduction.

USFWS guidelines (US Fish and Wildlife Service 1989) recommend that black-tailed prairie dog towns or complexes greater than 81 acres be surveyed for the presence of black-footed ferrets before determining effects on the species. Black-tailed prairie dog towns or complexes of fewer than 81 acres having no neighboring prairie dog towns may be developed or treated without ferret surveys. Prairie dog towns in Wyoming were block cleared in 2004 and ferret surveys are no longer recommended because the chance of ferrets being discovered is negligable.

4-1.2.1 Direct and Indirect Effects

There is historical evidence for black-footed ferret presence in the Black Hills area, although they have not been seen for several decades. There is little expectation that ferrets will be found on the Forest. Ferrets would probably need to be translocated in order to establish a population. Since there is insufficient prairie dog town habitat, according to reintroduction guidelines, reintroduction is unlikely.

Because black-footed ferrets are associated with prairie dog complexes and prairie environments, differences among the alternatives in forested ecosystem management are unlikely to have an effect on potential habitat.

The proposed action contains guidance for restoring grassland habitats. The proposed action would increase the extent of grassland habitats by restoring 12,000 acres of prairie grasslands. Objective 200-09 manages for 200 to 300 acres of prairie dog towns in at least 3 colonies. Objective 200-09 was based on current conditions: the three largest towns on the Forest total about 256 acres and the other towns are small and are extensions of towns on private land.

Maintenance of the smaller towns may be dependant on activities on adjacent private lands.

These restorations, however, would have no impact on the feasibility of introducing ferrets on the Forest. 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. Some expansion of existing towns may occur or new towns may be discovered, but large areas (greater than 1000 acres) of potentially suitable prairie dog habitat are not expected to be present on the Forest. Even when including prairie dog towns on adjacent lands, the towns are small and disjunct.

Black-footed ferrets do not currently exist in the Black Hills, potential habitat is limited, and habitat conservation and restoration efforts would not appreciably enhance the area suitable for ferrets. Implementation of the Phase II Amendment proposed action would have no impact on black-footed ferrets.

4-1.2.2 Cumulative Effects

The only lands with potential to support black-footed ferret populations are found in the southern Black Hills. Both Wind Cave National Park and Custer State Park are located in this southern forested-prairie ecotone and contain prairie dog towns. Wind Cave National Park has considered ferret introductions, but no introductions are planned in the foreseeable future. Management of existing prairie dog colonies and grassland restoration on the Forest is not likely to create additional suitable habitat for ferret reintroduction on the Forest or on adjacent Custer State Park or Wind Cave National Park lands. Prairie dog towns on the Forest will likely continue to be inadequate for supporting a ferret population. Information on prairie dog towns on private lands in the area is limited but also appear to be small and disjunct. There are no known future state, tribal, or private actions considered “reasonably certain to occur” that may affect black-footed ferrets in the Black Hills. No cumulative effects are anticipated.

Determination and Rationale

No effect. Black-footed ferrets are not known to occur in the Black Hills. Potential suitable ferret habitat on the Forest is marginal due to the limited acreage and isolated distribution of prairie dog towns. Potentially suitable habitat does not meet the criteria for possible reintroduction. Even with the implementation of grassland habitat and prairie dog town protections and enhancements the Forest is unlikely to support a population of black-footed ferrets.

4-1.3. Gray Wolf

Historically, the northern Rocky Mountain population of the gray wolf (*Canis lupus irremotus*) occurred throughout all or portions of Washington, Oregon, Idaho, Montana, Wyoming, and western South Dakota, including the Black Hills (US Fish and Wildlife Service 1987). These wolves were extirpated from Wyoming, South Dakota, and other portions of their range by the mid-20th century.

The US Fish and Wildlife Service recently established three distinct population segments (DPS) of the gray wolf in the lower 48 states; two of these apply to the Black Hills (US Fish and Wildlife Service 2003a). The Eastern DPS includes North and South Dakota, Minnesota, Nebraska, Kansas, and other states to the east of these mentioned (US Fish and Wildlife Service 2003b). The Western DPS includes all or portions of Wyoming, Utah, Colorado, and other western areas (US Fish and Wildlife Service 2003c). Although Wyoming is within the Western DPS, it also holds experimental nonessential population status, meaning separate regulations apply. Because the Black Hills straddle the Wyoming-South Dakota border, both Eastern DPS and experimental nonessential population regulations apply.

The Northern Rocky Mountain Wolf Recovery Plan sets forth recovery objectives for the wolf population in Wyoming and other parts of the Western DPS (US Fish and Wildlife Service 1987). As part of this recovery plan, wolves were reintroduced into Yellowstone National Park in 1995 and 1996 as an experimental nonessential population. Recovery objectives have been met in the Yellowstone recovery area and the entire Western DPS, (US Fish and Wildlife Service 2004b). As of December 2003, there were 14 packs documented in Yellowstone Park, with an additional 10 packs outside the Park in Wyoming (US Fish and Wildlife Service et al. 2004). This exceeds recovery plan objectives. The closest documented wolves to the Black Hills that occur in Wyoming are near Tensleep, on the western slope of the Bighorn Mountains. The two to three dispersing wolves seen there in 2003 were not considered an established pack (US Fish and Wildlife Service et al. 2004). One of the Tensleep wolves was legally killed in response to livestock depredations.

Due to the success of the wolf recovery program in the West, the US Fish and Wildlife Service intends to propose delisting the Western DPS (including the experimental nonessential population) as soon as state management plans are approved in the affected states (Wyoming, Montana and Idaho) (US Fish and Wildlife Service 2003c). Currently, Wyoming is the only state without an approved plan (US Fish and Wildlife Service 2004).

The thrust of the Eastern DPS recovery program occurs in Minnesota, Wisconsin and Michigan. This program has also been very successful, which has led the US Fish and Wildlife Service downlist the wolf from endangered to threatened status (US Fish and Wildlife Service 2003b). This threatened status applies in South Dakota. Recovery objectives have been met, and the US Fish and Wildlife Service has announced intent to delist the Eastern DPS of the gray wolf (US Fish and Wildlife Service 2003b).

Historically, wolves occupied a wide range of habitats. Availability of prey, particularly large ungulates, was probably the main factor affecting their abundance and distribution (US Fish and Wildlife Service 1987). Conflicts between humans and wolves, particularly as it relates to livestock, led to widespread lethal control of wolves. Human tolerance (or lack thereof) of wolves has now become the main factor controlling the abundance and distribution of wolves in the United States.

Increasing numbers of wolves in the United States has led to an increase in dispersal of mostly young wolves. In some situations, subordinate wolves may disperse hundreds of miles (Van Camp and Gluckie 1979); however, mortality is often high among dispersing animals. Thus,

the chances of finding a mate and successfully establishing a new pack are low (US Fish and Wildlife Service 1987).

Recent wolf reports in North and South Dakota are thought to be of lone dispersers originating from Minnesota (US Fish and Wildlife Service 2000). There has been one reported wolf sighting on the Forest; it occurred during November 2001 (M. Kintigh pers. com. 2001). However, the potential for the establishment of a viable and self-sustaining wolf population anywhere in North or South Dakota is considered low (US Fish and Wildlife Service 2000).

An established pack or population in the Black Hills is not required for recovery or delisting either the Eastern or Western DPS. In fact, the US Fish and Wildlife Service has acknowledged that South Dakota lacks significant recovery potential for the gray wolf in South Dakota, and has stated that even lethal depredation control activities to protect livestock would not slow the recovery or delisting of the Eastern DPS (US Fish and Wildlife Service 2000). There is an approved plan to respond to depredation issues in South Dakota that entails removal of offending wolves. Although lethal control is not the preferred method of removal, it could be used under some circumstances.

The Black Hills contain a suitable prey base of resident elk, white-tailed deer, and mule deer (USDA-Forest Service 1996). The populated nature of this area, in conjunction with dominant agricultural uses, greatly reduce the likelihood that human tolerance of wolves would be high enough to allow even dispersing individuals to remain here even if natural prey exist.

4-1.3.1 Direct and Indirect Effects

It is unknown whether wolves will recolonize the Black Hills on their own. The US Fish and Wildlife Service has no plans to reintroduce wolves here; in fact, they have acknowledged that South Dakota lacks significant recovery potential for the gray wolf, and even lethal depredation control activities would not slow the recovery or delisting of the eastern DPS (US Fish and Wildlife Service 2000).

A suitable prey base for gray wolves does exist on the Forest. Objective 217 would maintain habitat for game populations in the event that wolf recovery objectives or expectations were to change. No other Forest management direction would affect the gray wolf in the Black Hills.

4-1.3.2 Cumulative Effects

Widespread livestock production and expanding urban development both provide conditions that are detrimental to the successful establishment of wolves in the Black Hills. However, in the event that recovery objectives or expectations were to change, state management of big game on and off the Forest would likely ensure a suitable prey population for wolves.

4-1.3.3 Determination and Rationale

No effect (South Dakota).

Not likely to jeopardize continued existence or adversely modify proposed critical habitat (Wyoming)**.**

Gray wolves are not known to occur in the Black Hills, except for an occasional dispersing individual. The US Fish and Wildlife Service has acknowledged that South Dakota lacks significant recovery potential for the gray wolf. Population objectives have been met in Wyoming, and no packs are desired or expected in the eastern portion of the state. Therefore, Forest management direction would have no effect on the gray wolf.

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PHASE II AMENDMENT
BLACK HILLS NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN

BIOLOGICAL EVALUATION

SENSITIVE SPECIES

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Acknowledgements

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1-0. INTRODUCTION

The U.S. Department of Agriculture (USDA)-Forest Service is proposing to amend the 1997 Land and Resource Management Plan (LRMP) for the Black Hills National Forest (the Forest).

An LRMP creates a framework for decision making on Forest managment. On August 19, 1983, the Regional Forester for Region 2 (Region 2), the Rocky Mountain Region of the USDA-Forest Service, approved the original LRMP for the Forest. Subsequently, new information and regulations were incorporated in a revision and released in 1996 as the Revised LRMP for the Forest. The revisions were evaluated under the National Environmental Policy Act (NEPA) in a 1996 environmental impact statement (EIS). In 1997, an errata, a revised reference list, and letters received since the Final EIS release were presented in the 1997 Revised LRMP Final EIS Addendum. A Record of Decision (ROD) was signed for the Revised LRMP Final EIS and Addendum, establishing the 1997 Revised LRMP as the new Forest guidance. The 1997 Revised LRMP and its Appendices; the Final EIS for the 1997 Revised LRMP including a revised biological assessment/biological evaluation (BA/BE) in Appendix H; the Final EIS Addendum and ROD; and the associated Planning Record are incorporated in this document by reference.

A number of groups and individuals submitted appeals of the Regional Forester's decision. On October 12, 1999, Deputy Chief James R. Furnish, the Reviewing Officer for the Chief of the USDA-Forest Service, issued his decision on three of the appeals in the 1999 Appeal Decision. His decision affirmed the Regional Forester's June 24, 1997 decision with instruction for further actions concerning, in part, the issues relating to species viability and diversity.

The 1999 Appeal Decision identified interim direction that required the Forest to avoid management actions that could adversely affect species viability and diversity pending revision of the 1997 Revised LRMP. The USDA-Forest Service developed an Action Plan to implement instructions for further action in the 1999 Appeal Decision. The Action Plan schedule set forth required adjustments to the 1997 Revised LRMP in two phases: a short-term, interim Phase I and a long-term, comprehensive Phase II.

The Phase I effort was completed on May 18, 2001 and included an amendment to the 1997 Revised LRMP for the short term (two to five years). The Phase I Amendment addressed certain deficiencies in the 1997 Revised LRMP as identified in the 1999 Appeal Decision.

The Phase I Amendment incorporated new and updated monitoring protocols into the 1997 Revised LRMP Monitoring Implementation Guide for sensitive species survey and monitoring; streambank monitoring; and evaluation of the effectiveness of Best Management Practices (BMP) for the Prevention of Non-Point Source Pollution. The

Forest Service Manual (FSM) provides direction that will continue to be followed for management indicator species (MIS) at FSM 2621 and sensitive species at FSM 2670. Adoption of this direction indicated that actions taken during the next two to five years would not be expected to foreclose future management options concerning species viability and diversity and that habitat would be maintained on the Forest for species for which there may be a viability concern. This approach allowed the Forest to proceed with management actions until completion of the more comprehensive Phase II Amendment while minimizing risk for these species.

Shortly after the Chief's Appeal Decision in November 1999, several individuals and groups filed suit against the Forest Service to block implementation of the Veteran Salvage Timber Sale within the Beaver Park Roadless Area. The lawsuit cited several of the deficiencies identified in the Chief's Appeal Decision and claimed Forest Plan direction was inadequate to protect certain resources in the timber sale area. Negotiations were initiated to settle the lawsuit, and in September 2000 a Settlement Agreement (the Settlement) was signed and issued by the parties (Civil Action 99-N-2173, US District Court for the District of Colorado 2000). In signing the Settlement, the Forest agreed to undertake the Phase I and Phase II Forest Plan amendments. Further, the Forest agreed to consider several specific items in the Phase II effort including the analysis of research natural areas (RNAs) and further evaluation of management indicator species (MIS) and northern goshawk.

In August 2000 the Jasper Fire started west of Jewel Cave National Monument on Forest-administered lands. By the time the fire was controlled in mid-September it had burned over 83,000 acres of National Forest System (NFS) lands. The Jasper Fire occurred during one of the most extensive fire seasons in history nationally and during a time of prolonged drought conditions on the Forest. The national events of the 2000 fire season led to the development of the National Fire Plan (NFP), a large-scale policy initiative to address hazardous fuel conditions on forest and rangelands nationwide.

Since that time several large fires have occurred on the Forest. In addition, a mountain pine beetle (MPB) outbreak that began in the late 1990s in the Beaver Park area has grown to epidemic proportions and is affecting several areas of the Forest. The Forest has initiated a number of projects to aggressively address insect hazard and Forest fuel conditions, both of which have been exacerbated by continued drought. The implementation of at least one of these projects required non-significant amendments to Forest Plan direction.

Phase II of the Action Plan was initiated to implement instructions for further action in the 1999 Appeal Decision and to re-evaluate the sufficiency of the 1997 Revised LRMP in relation to species viability and diversity. The analysis in this Final EIS builds on the information developed by the Forest's 1997 Revised LRMP Final EIS and the Phase I Amendment analysis. The Forest published a Notice of Intent (NOI) to prepare an EIS for the LRMP Phase II Amendment on November 28, 2001 (66 FR 59406).

2-0. PROJECT DESCRIPTION

2-1. PURPOSE AND NEED

The LRMP sets programmatic direction and creates a framework for project-level decision making and compliance with federal environmental policies. This Final EIS addresses the general effects of implementing this programmatic direction. It does not speak directly to the effects that might arise from site-specific or project-specific implementations of that direction.

The purpose for the proposed action is to address deficiencies in the 1997 Revised LRMP as identified in the 1999 Appeal Decision; to address related requirements of the 2000 Settlement Agreement; and to address Forest health needs that have changed from those analyzed in the EIS for the 1997 LRMP. Based on this purpose, the following actions are required:

- Re-evaluate the sufficiency of the 1997 Revised LRMP regarding provisions for the diversity of plant-and-animal communities (including MIS) and species viability, consistent with the 1999 Appeal Decision;
- Complete an analysis of candidate areas for RNAs as agreed to in the 2000 Settlement Agreement; and
- Consider fire-and-insect hazard management to address species viability and diversity as well as threats to human life and property and public lands and resources in light of continuing insect attack, persistent drought, elevated fuel hazard, and recent national policy initiatives.

2-2. AREA AFFECTED BY THE PROPOSED ACTION

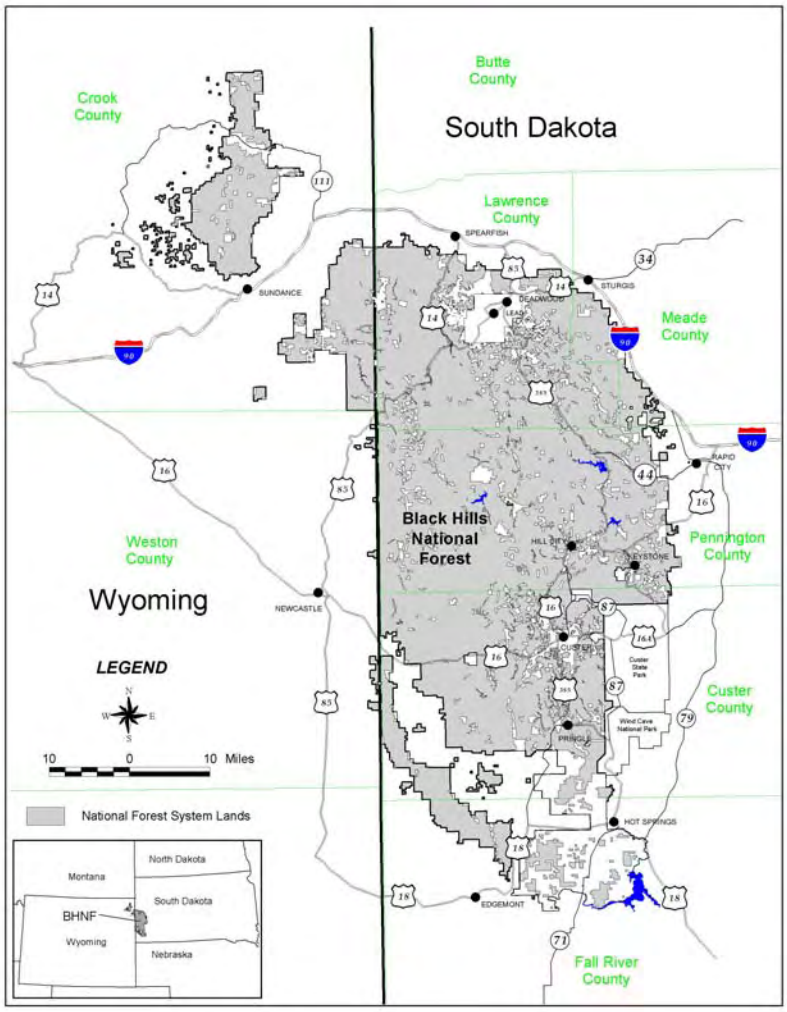
The Black Hills National Forest is located in western South Dakota and northeastern Wyoming. Portions of the Forest occur within five counties of South Dakota (Custer, Fall River, Lawrence, Meade, and Pennington) and two counties of Wyoming (Crook and Weston). The 1.2 million-acre Forest includes most of the Black Hills and a disjunct range in Wyoming, the Bearlodge Mountains.

Four major ecosystem types occur on the Forest: Forested Ecosystems, including ponderosa pine, white spruce, and hardwoods; Grassland/Shrubland Ecosystems; Riparian/Wetland Ecosystems; and Aquatic Ecosystems, including streams and reservoirs. Ponderosa pine makes up the largest community type in the Forest, with grasslands, hardwoods, and white spruce following in descending order. Aquatic habitat (excluding stream miles) and riparian habitat each make up less than one percent of the entire Forest area. The spatial distribution of ecosystems within the Black Hills is a result of interrelated factors including physiography, geology, climate, soils, and land use (Shepperd and Battaglia 2002; USDA-Forest Service 1996). The variety of ecosystem types and the plant communities within them provide for a diversity of wildlife in the Forest.

Early accounts of the Black Hills document that ponderosa-pine coverage was widespread but also noted that its extent was limited by disturbance (Parrish et. al 1996). Natural disturbance activities included beaver activity, weather events (i.e., wind, snow, lightning, and hail), insects, disease, and fire (Shepperd and Battaglia 2002). Historically, hardwood, herbaceous, and shrub communities were more abundant and diverse while pine and spruce communities were less extensive (USDA-Forest Service 1996).

Fire suppression and forest management in the early 20th century, caused a shift in the abundance and makeup of different habitats within the Forest. Deciduous forests, riparian areas, shrublands, and grasslands were reduced and eventually converted to ponderosa pine while the density and canopy cover of ponderosa-pine forests increased (Uresk and Severson 1998). Other activities such as logging, road construction, livestock use, mining, recreation, tourism, and development on federal, state, and private lands have all contributed to changes throughout the Forest ecosystems.

Black Hills National Forest Planning Area



2-3. ALTERNATIVES CONSIDERED

The five Alternatives carried forward for detailed analysis in this action are generally characterized in this section. The detailed direction in each alternative can be found in Chapter 2 and in Appendix D of the FEIS. See also Table 2-2 in Chapter 2 of the FEIS for a comparison of key differences between alternatives.

Alternative 1, The 1997 Revised Plan. Alternative 1 is the 1997 Forest Plan. Alternative 1 retains species viability and diversity and fire and insect direction included in the 1997 Revised Plan, including the management areas designated to manage for late successional habitat conditions (Management Area 3.7). This alternative retains the 1997 MIS list. The alternative does not include any candidate RNAs, nor does it include Goals 10 and 11, as described above. See also Table 2-2 for a comparison of key differences between alternatives.

Alternative 2, 1997 Revised Plan as amended by Phase I. Alternative 2 is the 1997 Forest Plan as amended by the Phase I Amendment. Selection of this alternative would make permanent the direction from the Phase I Amendment. Alternative 2 is a no-action alternative and retains species viability, diversity and fire and insect direction included in Phase I Amendment (USDA Forest Service, 2001c), including the management areas designated to manage for late successional habitat conditions (Management Area 3.7). This alternative retains the Phase I MIS list. The alternative does not include any candidate RNAs, nor does it include Goals 10 and 11, as described above. Alternative 2 includes increased or additional species and habitat protection direction over the 1997 Forest Plan, with primary emphasis on late-successional species. Implementation of Forest Plan objectives, standards, and guidelines below are generally expected to achieve the specified conditions in the first ten years of the plan.

Alternative 3. Alternative 3 emphasizes diversity through ecological restoration and retention of various habitat components across the landscape as part of the strategy for targeting the conservation of species viability and diversity. The needs of a number of the emphasis species are targeted through structural stage objectives for ponderosa pine and forest composition objectives for non-pine species as well as through other species conservation objectives, standards and guidelines. Emphasis species conservation is also targeted through further management for a diversity of landscapes across the Black Hills National Forest including the restoration of 46,000 acres of aspen, 4,000 acres of bur oak, 2,400 acres of meadow, 12,000 acres of grassland, doubles the riparian restoration objective of Alternatives 1 and 2, and similar to those alternatives, this alternative continues to manage areas specifically for late successional conditions (see MA 3.7), manages for mature and late successional conditions through structural stage objectives in some specific management areas (see below) and retains the Black Elk Wilderness Area (MA 1.1A) that includes late successional condition features (e.g. MA 1.1 A). Fire and insect hazard reduction is targeted in the Wildland Urban Interface (WUI) in Objective 10-01, by specifying a target of 50 percent moderate-to-low fire hazard rating in the WUI and for emphasis species conservation. Objective 10-03 targets the reduction of fire hazard in areas between RNAs and designated At-risk Communities (ARCs). Fuel reduction activities adjacent to late-successional habitats would be targeted increase the

likelihood of conserving emphasis species associated with late-successional habitats. Following a wildfire, dead trees are generally expected to be available for value recovery except under certain conditions. See Table 2-2 for a comparison of key differences between alternatives.

Alternative 4. This alternative emphasizes dense mature and late successional conifer conditions. In Alternative 4, Objective 207 retains the statement to manage at least 5 percent of the forested land base for late succession, similar to Alternatives 1 and 2. In addition, Objective 207 includes direction to maintain conditions of all existing late-successional and dense mature stands (Structural Stages 5 and 4C). The primary focus of this alternative is on species associated with late successional forest conditions. Long-term species viability and diversity for these species is expected to be provided primarily through Forest Plan direction emphasizing a mature-forest community. Deer and elk habitat effectiveness guidelines are deleted in Alternative 4. Similar to Alternatives 1 and 2, this alternative requires all vegetation management projects in watersheds not meeting the minimum hard snag direction to be designed to move hard snag densities towards this objective. Similar to Alternative 2, Alternative 4 directs the retention of large trees for the purpose of snag recruitment. See Table 2-2 for a comparison of key differences between alternatives.

Alternative 6. Alternative 6 increases the acreage of the Forest to be targeted at moderate-to-low fire-and-insect hazard rating conditions, except within certain Forest management areas. Restoration and management for aspen and targeting the removal of conifers to restore or manage areas for less flammable cover types such as hardwoods and riparian shrublands is emphasized. Restoration direction for various ecosystem components is similar to restoration specified in Alternative 3. This alternative manages fewer acres for Structural Stages 4C (mature) and 5 (late successional) in MAs 4.1, 5.1, 5.4, 5.43, and 5.6 as compared to Alternatives 3 and 4. Alternative 6 includes four candidate RNAs that represent a majority of the target vegetation types. See also Table 2-2 for a comparison of key differences between alternatives.

3-0. SPECIES CONSIDERED IN THIS ANALYSIS

3-1. FOREST SERVICE REGION 2 SENSITIVE SPECIES

3-1.1. General Discussion

The table below lists species designated as sensitive species by the Rocky Mountain (Region 2) of the United States Forest Service (USDA-Forest Service 2005c) known or likely to occur on the Black Hills National Forest. Region 2 sensitive species are those plant and animal species identified by the Regional Forester for which population viability is currently of concern, as evidenced by significant current or predicted downward trends in population numbers or density, or by significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (USDA-Forest Service 2005c).

Table C-1. Forest Service Region 2 Sensitive Species Evaluated

Scientific Name	Common Name
Plants	
Botrychium campestre	Iowa moonwort
Botrychium lineare	Narrowleaf grapefern
Botrychium multifidum	Leathery grapefern
Carex alopecoidea	Foxtail sedge
Cypripedium parviflorum	Lesser yellow lady's slipper
Epipactis gigantea	Stream orchid
Lycopodium complanatum	Groundcedar
Platanthera orbiculata	Lesser round-leaved orchid
Salix candida	Sageleaf willow
Salix serissma	Autumn willow
Sanguinaria canadensis	Bloodroot
Viburnum opulus var. americanum	Highbush cranberry
Viola selkirkii	Selkirk's violet
Invertebrates	
Oreohelix strigosa cooperi	Cooper's mountainsnail
Speyeria idalia	Regal fritillary
Fish	
Phoxinus neogaeus	Finescale dace
Couesius plumbeus	Lake chub
Catostomus platyrhynchus	Mountain sucker
Macrhybopsis gelida	Sturgeon chub
Hybognathus placitus	Plains minnow
Reptiles	
Storeria occipitomaculata pahasapae	Black Hills redbelly snake
Amphibians	
Rana pipiens	Northern leopard frog

Table C-1. Forest Service Region 2 Sensitive Species Evaluated

Scientific Name	Common Name (Continued)
Birds	
Circus cyaneus	Northern harrier
Accipiter gentilis	Northern goshawk
Buteo regalis	Ferruginous hawk
Falco peregrinus	Peregrine falcon
Coccyzus americanus	Yellow-billed cuckoo
Athene cunicularia	Burrowing owl
Otus flammeolus	Flammulated owl
Melanerpes lewis	Lewis' woodpecker
Picoides dorsalis	Three-toed woodpecker
Picoides arcticus	Black-backed woodpecker
Lanius ludovicianus	Loggerhead shrike
Ammodramus savannarum	Grasshopper sparrow
Charadrius montanus	Mountain plover
Mammals	
Myotis thysanodes	Fringed myotis
Corynorhinus townsendii pallescens	Townsend's big-eared bat
Vulpes velox	Swift fox
Martes americana	American marten
Lontra canadensis	River otter
Cynomys ludovicianus	Black-tailed prairie dog

3-1.2. Biological Evaluation Process

A pre-field review was conducted by the Phase II Amendment contractors, SAIC, of available information to assemble occurrence records and describe habitat needs and ecological requirements for each species. Sources of information included Forest Service records and files; South Dakota Natural Heritage Program database; Wyoming Natural Diversity database; SDGFP; Wyoming Game and Fish Department; and published research (citations). This information served as the basis for determining the effects of the alternatives on Region 2 sensitive species.

Field reconnaissance has continued since the Phase I Forest LRMP Amendment Supplement to the Forest Plan BA/BE (USDA-Forest Service 2001c) for species from the 1993 Region 2 sensitive species list. The Region 2 sensitive species list was revised in December 2003 (USDA-Forest Service 2003c) and field reconnaissance began on a

number of those species in the summer of 2003. The information gathered from these surveys provided information on distribution and habitat associations for species and helped to determine effects of the alternatives. In addition, publications based on field work conducted by other parties in the Black Hills were also used. The Region 2 sensitive species list was revised again in May 2005 (USDA-Forest Service 2005c).

The analysis of potential effects on sensitive species was conducted using data gathered in the pre-field review and field reconnaissance on the habitat requirements and potential limits to persistence on the Forest for each species. The habitat requirements and potential limits to persistence for each species were then used to determine the effect of relevant objectives and standards on the likelihood of long-term persistence of each Region 2 sensitive species. The habitat trends and risks to persistence on the Forest were estimated based on the adequacy of the Forest Plan direction provided under each alternative. The overall conclusions were derived from anticipated trends, probable risks, and degree of uncertainty under each alternative. The determination language is set forth in Region 2 Supplement 2600-2005-1 to the Forest Service Manual.

Determinations for each species are made as a result of the information gathered during the pre-field review, field reconnaissance, and effects analysis. The basis for each determination is potential habitat, expected occurrence, distribution, effects from Forest activities, and proposed mitigation used to alleviate the potential effects resulting from Forest-management activities.

We examine probability of persistence to assess the status of each species. Factors influencing population fluctuations (survival, recruitment, immigration, emigration) are evaluated in the context of management, species natural history, and ecology. By focusing on persistence probabilities we can compare alternatives and rank the effects more effectively than is possible using the binary classification reached when using viable and not viable. Using an approach focused on probability of persistence does allow us to make a tie back to viability to meet requirements of effects analysis but provides a better assessment of status with a qualitative or quantitative expression of certainty.

3-1.3. Summary of Determinations – Region 2 Sensitive Species

3-1.3.1 Plants

The following Region 2 sensitive plant species have a determination of "**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"** for all alternatives:

- *Botrychium campestre* (Iowa Moonwort)
- *Botrychium lineare* (Narrowleaf Grapefern)
- *Botrychium multifidum* (Leathery Grapefern)
- *Carex alopecoidea* (Foxtail Sedge)

- *Cypripedium parviflorum* (Lesser Yellow Lady's Slipper)
- *Epipactis gigantea* (Stream Orchid)
- *Lycopodium complanatum* (Groundcedar)
- *Platanthera orbiculata* (Lesser Roundleaved Orchid)
- *Salix candida* (Sageleaf Willow)
- *Salix serissma* (Autumn Willow)
- *Sanguinaria canadensis* (Bloodroot)
- *Viburnum opulus* var. *americanum* (Highbush Cranberry)
- *Viola selkirkii* (Selkirk's Violet)

3-1.3.2 Animals

The following R2 Sensitive animal species have a determination of "**No Impact"** for all alternatives:

- Plains minnow *(Hybognathus placitus)*
- Sturgeon chub *(Macrhybopsis gelida)*
- Ferruginous hawk (*Buteo regalis)*
- Mountain plover (*Charadrius montanus)*
- Northern harrier (*Circus cyaneus)*
- Peregrine falcon (*Falco peregrinus)*
- River otter (*Lontra canadensis)*
- Swift fox *(Vulpes velox)*

The following R2 Sensitive animal species have a determination of "**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"** for all alternatives:

- Cooper's mountainsnail *(Oreohelix strigosa cooperi)*
- Regal fritillary *(Speyeria idalia)*
- Finescale dace *(Phoxinus neogaeus)*
- Lake chub *(Couesius plumbeus)*
- Mountain sucker *(Catostomus platyrhynchus)*
- Northern leopard frog *(Rana pipiens)*
- Black Hills redbelly snake *(Storeria occipitomaculata pahasapa)*
- Black-backed woodpecker *(Picoides arcticus)*
- Burrowing owl (*Athene cunicularia)*

- Flammulated owl *(Otus flammeolus)*
- Grasshopper sparrow *(Ammodramus savannarum)*
- Lewis' woodpecker *(Melanerpes lewis)*
- Loggerhead shrike (*Lanius ludovicianus)*
- Northern goshawk *(Accipiter gentilis)*
- Three-toed woodpecker *(Picoides dorsalis)*
- Yellow-billed cuckoo *(Coccyzus americanus)*
- Black-tailed prairie dog *(Cynomys ludovicianus)*
- American marten *(Martes americana)*
- Fringed myotis *(Myotis thysanodes)*
- Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*

4-0. ANALYSIS OF EFFECTS - FOREST SERVICE R2 SENSITIVE SPECIES

4-1. SPECIES DESCRIPTIONS AND EFFECTS ANALYSIS – PLANTS

This section contains the distribution and status, natural history, direct and indirect effects, cumulative effects, resource conservation measures, and determination and rationale for R2 sensitive plants.

4-1.1. *Salix serissima* (Autumn Willow)

The Revised Black Hills National Forest Land and Resource Management Plan (LRMP) Biological Assessment/Biological Evaluation (BE) (USDA Forest Service 1996 Appendix H) and the LRMP Phase I Amendment BE (USDA Forest Service 2001c) give an overview of *Salix serissima* distribution and life history, and is incorporated here by reference. In addition, an assessment of *S. serissima* in the Black Hills (Hornbeck et al. 2003) was prepared and serves as a primary reference for the following analysis.

Salix serissima occurs primarily in northern boreal bogs throughout its range and is a disjunct relic in the Black Hills (Hornbeck et al. 2003a). The two Black Hills National Forest *S. serissima* occurrences that were known prior to 2004, are associated with specific geologic and hydrologic conditions that have resulted in an elevated water table and fen-like habitats and saturated organic substrates (Hornbeck et al. 2003a). Its potential habitat is very limited in the Black Hills. The largest of those two occurrences on lands administered by the Black Hills National Forest is located at McIntosh Fen Botanical Area (Management Area 3.1), and the other is a smaller occurrence which is located approximately 12 miles to the north on Middle Boxelder Creek. Late in the season (August) of 2004, two additional sites were discovered and reported with single individuals of *S. serissima* (USDA Forest Service 2005d). These two new reports are from lands administered by the Forest, located near Nahant and Silver Creek and within less than five miles of the Middle Boxelder Creek occurrence. Two other verified occurrences have been reported from private lands in Lawrence County, South Dakota, and one unverified occurrence has been reported from Custer County. The closest *S. serissima* occurrence to locations in the Black Hills is 250 miles away in southern Wyoming. Other, more distant occurrences are in Montana, North Dakota, Minnesota, and Canada (Hornbeck et al. 2003a).

Salix serissima is a northern species, which is rare here largely because wetlands meeting its habitat requirements are uncommon toward the southern edge of its distribution. Accordingly, the species is ranked “critically imperiled due to extreme rarity” (S1) in both South Dakota and Wyoming. The current global rank for the species is (G4) indicating that the species is considered to be apparently secure globally (NatureServe 2005a).

Salix serissima is a perennial, deciduous obligate wetland shrub that is found in bogs, fens, and marshes across the species range. These habitats may have a high mineral content and alkaline

pH, although in the main part of the willow's range the habitats are often acidic. It flowers from June to September and is likely pollinated by both wind and insects. It is unlikely that its minerotrophic fen habitats have ever been common (Hornbeck et al. 2003). Remnant old beaver dams are evident in and near both of the two largest Forest occurrences of *S. serissima*. A full set of site data is not yet available for the new 2004 reported locations so it is unknown if old beaver dams are associated with those locations. Historically, *S. serissima* may have been more abundant in the Black Hills due to its association with beaver-created wetlands, which can have fen-like qualities. Historic reductions in beaver and the wetland habitat that they maintained and created most likely have had a negative affect on the *S. serissima* and its fen habitat (USDA Forest Service 2001a). The amount of aspen that historically occurred adjacent to the wetlands at McIntosh Fen (and likely contributed to support beaver in this area) has declined since the 1930s due to the site's use as an agricultural water source while under private ownership.

Individual counts of *Salix serissima* collected during monitoring at the McIntosh Fen Botanical Area have increased or stabilized since 357 individual plants were documented at two sub-occurrences at McIntosh Fen in 2000 (Hornbeck et al. 2003a). Greater than 450 individual plants are currently known at McIntosh Fen Botanical Area (USDA Forest Service 2005a). The original baseline data collection effort for the Middle Boxelder Creek occurrence that was located in 2002 documented 13 *S. serissima* individuals (Hornbeck et al. 2003a). Monitoring of the Middle Boxelder site in 2003 and 2004 documented 16 *S. serissima* individuals (USDA Forest Service 2005a).

As mentioned in the previous paragraph, baseline and monitoring data (collected since 2000) indicate that the McIntosh Fen occurrence has been relatively stable since monitoring began. This could be the result of initial restoration efforts of the local hydrology, recent high precipitation years (prior to 2000) or a combination of these and other favorable environmental conditions (Hornbeck et al. 2003a).

4-1.1.1 Direct and Indirect Effects

The long term persistence of *Salix serissima* in the Black Hills is uncertain (Hornbeck et al. 2003a). The persistence of this species in the Black Hills is contingent on conserving the occurrence at McIntosh Fen and conserving or enhancing the site conditions and individuals at the smaller occurrence at Middle Boxelder Creek. Since baseline data is currently unavailable for the two recently (late season 2004) discovered occurrences, it is unknown if it is likely that these single individual sites can be conserved to contribute towards the long term persistence of this species in the Black Hills. The habitat for *S. serissima* is very limited within the Forest, which makes the four known occurrences vulnerable to catastrophic and stochastic events. Because this is an obligate wetland species, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced (USDA Forest Service 2005b, Hornbeck et a. 2003a). Noxious weeds, invading woody species (conifer encroachment), fungal infections or insect infestations have been identified as posing concern for this species. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen Botanical Area, although high soil moisture levels in the fen itself appear to generally exclude Canada thistle from the *S. serissima* habitat. *Lythrum salicaria* (purple loosestrife is not known to occur at either of the larger sites, or anywhere close by, but is very aggressive and has the potential to out compete riparian natives, including *S. serissima*. Information on noxious weeds

or other invasive species is not yet available at the two new 2004 reported locations. A fungal infection was noted on the leaves of *S. serissima* in McIntosh Fen in 2001 and willow borer has been documented at the Middle Boxelder Creek occurrence. Recreational fishing activities occur along Castle Creek (near the fen), and a designated snowmobile trail crosses the Botanical Area, but does not extend into the *S. serissima* occurrence. At this time, no impacts have been documented to the willow from either activity (USDA Forest Service 2005a, 2004c). Although no impacts have been documented from wildlife use or trespass cattle at either of the occurrences, both could be a potential risk at either site (Hornbeck et a. 2003a).

Active measures are currently being implemented to conserve and enhance conditions at McIntosh Fen where the largest occurrence of *Salix serissima* is located. The Middle Boxelder Creek occurrence (located in 2002) is not within a designated Botanical Area, however, it is located within a fenced exclosure is expected to be maintained to restrict livestock access and limit the site from other disturbances (Hornbeck et al. 2003a). All Phase II Amendment alternatives include conservation measures for the Botanical Area as well as for other riparian and wetland areas; in addition Alternatives 3 and 6 contain additional measures that are expected to benefit *S. serissima*. Alternatives 3 and 6 include a standard that prohibits authorized livestock use on any known occurrences of R2 Sensitive willows (Standards 2505e). This standard was not a part of either of the No Action alternatives (1 and 2) and is not part of Alternative 4. Other conservation measures are included for the McIntosh Fen Botanical Area which includes limiting vehicle use to designated routes within the area (Standards 3.1-9101, 9102, and 9103) and prohibiting adverse disturbances from developments (Standards 5200-1 and 3106 a-c and Guidelines 3607 a-c). Botanical Management Area direction wording was revised for the Action alternatives in an attempt to clarify the intent of Standard 3.1-2503 from No Action Alternative 2. The action alternatives (Alternatives 3, 4 and 6) clarification directs the restriction of livestock from accessing Region 2 Sensitive Species in Botanical Areas.

Conservation or enhancement measures that could target conserving existing levels or potentially increase water tables at *Salix serissima* locations include management activities that restore conditions favorable to the long-term goal of reintroducing beaver into Castle Creek near the McIntosh Fen occurrence. All alternatives seek to maintain or restore historic wet areas, wet meadows, and beaver (Objective 215). Any successful restoration of hardwoods (aspen), and reintroduction of beaver (Objective 215) along adjacent Castle Creek at McIntosh Fen and just upstream of the Fen along Castle Creek and Silver Creek, and adjacent or upstream of the occurrence at in Middle Boxelder Creek would be expected to conserve or improve saturated soil conditions at these sites that could contribute to the likely long term persistence of *S. serissima* on Forest lands. In addition, Objective 214 targets 500 acres of riparian shrub community restoration under Alternatives 1, 2, 4 and 6 and 1, 000 acres under Alternatives 3. Implementation of this objective under Alternative 3 could occur anywhere on the Forest and could be prioritized for species needs, such as for *S. serrisima*. Alternative 6 (targeting half of riparian restoration acres than Alternative 3) prioritizes riparian restoration efforts in areas surrounding Federal Register designated At Risk Communities (Vol. 66 Federal Register, Beginning Page 753, January 4, 2001; Vol. 66, Federal Register, Beginning Page 43384, August 17, 2004) which could benefit *S. serissima* at McIntosh Fen since activities are expected to occur within a 1.5 miles of the designated Deerfield ARC. However, there is a great deal of uncertainty on any effects statements regarding treatments around At Risk Communities and *S. serissima* because without a priority system or a map indicating which At Risk Communities are targeted

first or to what level, it is not known if any treatments would even occur within the immediate vicinity of occurrences (refer to Appendix B of the FEIS for discussion of At Risk Communities and the Wildland Urban Interface for more information). Since little is known about the two new 2004 single individual reported *S. serrisima* locations, other than they are immediately adjacent to private land, it is unknown if site features would lend themselves to the likelihood of implementation of the various objectives mentioned, and therefore it is unknown if any benefits could be realized to the species long term persistence at either location.

Recognizing noxious weeds and other invasive plants, and their treatment, as a primary risk to the species' long-term persistence on the Black Hills, conservation strategies and measures to address and reduce direct and indirect effects are given priority discussion in this section. All alternatives target various levels of conservation and protection for Region 2 Sensitive species from noxious weed invasion and treatment. Objective 231 is included in all alternatives to target prevention and reduction of noxious weed invasion into native plant communities. In Alternatives 1 and 2 the targeted objective is to treat 3,600 acres per year. Targeted treatment acres are increased to a minimum of 6,000 acres per year in Alternatives 3 and 4 and to 8,000 acres in Alternative 6. Guideline 4303 revised the priority order for treatment of weeds and first priority of treatment is to occur at Region 2 sensitive and Species of Local Concern (SOLC) plants and snails. Guideline 4304 (Alternatives 1 and 2) was revised and elevated to a standard and in Alternatives 3, 4, and 6 to using treatment methods that pose the least risk to the species being protected. Alternatives 1 and 2 are silent on the monitoring of weed control effectiveness at Region 2 Sensitive species locations to determine if weeds at those sites need to be re-treated throughout the season to reduce noxious weed competition. Standard 4300-1 specifies this type of monitoring and was included for implementation in Alternatives 3, 4, and 6 to further address the risk that noxious weeds present to Region 2 Sensitive plant species such as *S. serissima*. Alternatives 1 and 2 require the use of certified noxious weed-free seed, feed, and mulch on the Forest (Standard 4306). For Alternatives 3, 4 and 6, this standard was revised to require that the seed that is to be used on the Forest be tested at time of purchase to confirm that the seed is weed-free. Mitigation of noxious weed invasion or invasion by other exotic plant species into native plant communities by revegetating with native species is included as a Guideline (1110) in Alternatives 1 and 2. The original guideline was revised and was elevated to a standard for Alternatives 3, 4, and 6 (Standard 1110). Since noxious weed occurrences and various species are becoming more prevalent on the Forest (USDA Forest Service 2003b) and lands of other ownership in the Black Hills, as well as being identified as one of the primary risks for *S. serissima* (USDA Forest Service 2005b, Hornbeck et al 2003a), the assumption is that Alternatives 3, 4, and 6 would be expected to have a greater reduction in risk of indirect and direct effects to *S. serissima* from noxious weeds and their treatment in comparison to effects of implementation of Alternatives 1 and 2 (see section 3-6.3 Noxious Weeds).

Because the two previously known *Salix serissima* occurrences are located within fenced areas that restrict activities, and one of the new 2004 reported locations (Nahant) is in area that is outside of an allotment fence and should be off-limits to livestock access (Zacharkevics, personal communication 2004), other standards and guidelines for limiting effects from those activities would be expected to have little direct influence on these occurrences. However, if riparian conservation standards and guidelines are implemented in areas upstream of the occurrences, they could be expected to indirectly contribute to conservation of saturated conditions at occurrence locations. Standards 1306 and 1505 and Guidelines 1303 and 9108 (all alternatives)

would be expected to contribute towards the maintenance or conservation of the integrity of existing riparian areas from authorized activities on Forest Serviceadministered lands, such as timber management, mining, roads, recreation, livestock use, and vehicle use. Guidelines 2505 and 2507 (Alternatives 1, 2, and 4) target the management of grazing in riparian areas to a residual objective; under Alternatives 3 and 6 these guidelines are elevated to standards to target the objective of conserving or enhancing riparian habitats. The 2004 reported location of *S. serissima* at Silver Creek is currently being accessed by cattle. Alternatives 3 and 6 require (Standard 2505e) that no utilization be allowed on known occurrences of emphasis willow species, such as *S. serrisima*, removing any direct effects to the species from Forest authorized livestock use under those alternatives. No requirements of this nature are specifically included in Alternatives 1, 2 and 4. Therefore, it is expected that indirect and direct effects to *S. serrisima* from livestock use would be the least under Alternatives 3 and 6.

Although disturbance activities for at least two (McIntosh Fen and Middle Boxelder Creek) of the occurrences are generally not expected, implementation of some targeted conservation activities may result in some disturbances. Any activity that would be expected to result in soil disturbances near or within riparian areas would be subject to meeting Standard 3106 under Alternatives 3 and 6 and expected to meet Guideline 3107 under Alternatives 1, 2, and 4. The various subsections of Standard 3106 or Guideline 3107 provide direction for protection of or minimizing risks to riparian conditions and emphasis species, such as S. serissima that may occur there.

Because conifer encroachment has been recognized as a risk to the species (Hornbeck et al 2003a) a widespread reduction in the amount of conifer cover in the Castle Creek or Middle Fork Boxelder watersheds that may be caused by a wildfire, large scale mountain pine beetle (MPB) infestations, (as currently occurring within the watershed) (USDA-Forest Service 2003f) or through intensive acreages of fuel reduction thinning, or insect-management activities to the extent that an increase in the water table that could actually be realized at the known *Salix serissima* occurrences could be expected to conibute to the conservation or increasing the extent of saturated soil conditions and would be expected to benefit this willow. Various areas of higher mountain pine beetle hazard ratings would be expected to be reduced under all alternatives as vegetation treatments occur. Alternative 6 emphasizes more treatment acres reducing fire hazard and risk (see Section 3-7.2), with priority of treatments focused near designated At Risk Communities (ARC).

Objective 200-01 was originally designed for Alternatives 3 and 6 to address a variety of risks associated with conifer encroachment for a number of the emphasis plant species. The objective was designed to favor hardwood restoration where spruce has encroached into hardwoods and where beaver reoccupation is desired to target conservation of the species. The removal of conifers (including spruce) at both of these sites, with the intent of rejuvenating aspen for the long-term reoccupation by beaver to conserve and enhance saturated conditions, is expected to be a primary contributing factor for the species' long-term persistence. Revision of objective wording that is now contained in Alternative 6 still indicates that a treatment of spruce is still to occur, however, at least 20,000 acres of spruce is to be managed for under the alternative and it is uncertain that spruce encroachment removal desired at or adjacent emphasis plant species locations can be achieved. Therefore it is not known if Alternative 6 would be as successful at targeting this conservation measure for emphasis plant species as Alternative 3. No version of

this objective is included in Alternatives 1, 2, and 4. Alternative 2 and 4 directs maintenance of existing patch size of white spruce structural stages (Standard 3215), which can significantly limit or prohibit the likelihood of hardwood restoration acitivities identified as beneficial for the long term persistence of some emphasis plant species, such as *S. serissima*. This standard was revised for Alternatives 3 and 6 and identifies maintenance of canopy closures (40-50 percent) for marten corridors. Although not specified in the standard and actual site implementation is uncertain, it is assumed that this canopy closure would be composed primarily of conifer species rather than hardwoods. Therefore, in order to provide for other species associated with hardwoods, it is assumed that at the project design and implementation level that the connectivity corridor design and placement would include consideration of hardwood restoration and could still provide beneficial effects for long term persistence of species such as *S. serrisima*. Alternative 1 does not specifically address the removal of spruce encroachment into hardwoods or maintenance of canopy connectivity corridors. Refer to the section on marten in this Biological Evaluation for more information on spruce maintenance and connectivity corridors.

Another Objective 200-04 was designed into Alternatives 3, 4, and 6 for the Phase II Amendment for conservation of species such as *Salix serissima* with a limited number of occurrences, where the Black Hills population is expected to be at higher risk from loss to high severity or intense disturbance events. Objective 200-04 provides for the collection of material from Black Hills for reintroduction efforts into occurrence sites that were lost to these events, and where there it is likely that reintroduction efforts would be expected to be successful. This material could also be used for expanding limited population size locations which could also benefit the long term persistence of this species. No direction for collection of emphasis plant species material is included within Alternatives 1 and 2.

Current monitoring is based on direction in FSM 2670 and Chapter 4 of the LRMP (1997), as amended by the Phase I amendment, and the Monitoring Implementation Guide (USDA Forest Service 2005b). Direction in Forest Service Manual 2670 and Chapter 4 of the 1997 LRMP do not specify the type and level of information that is needed in the monitoring of Region 2 Sensitive Species. A rigorous monitoring strategy was designed and implemented in 2000 for the occurrence at McIntosh Fen, and had been revised to assess the occurrence at Middle Boxelder Creek when it was discovered. Based on new information obtained from the 2004 monitoring season and the discovery of two additional occurrences, the monitoring design was further revised for the 2005 monitoring season. These modifications continue to attempt to detect and respond in a timely manner to changes in extent and condition of *S. serissima* and habitat. General Forest monitoring direction for Region 2 Sensitive Species has been revised during this amendment process and is included in Chapter 4 of the LRMP, as amended by the Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction). The current monitoring design specific to *S. serissima* is located in the Monitoring Implementation Guide, Black Hills National Forest Plan (USDA Forest Service 2005b).

Forestwide Guideline 8101 (all alternatives) prioritizes lands with riparian areas and streams for land acquisition. Acquisition of the any of the land upstream of the McIntosh Fen occurrence along Castle Creek would reduce the potential of development and associated potential effects of hydrologic alterations. Acquisition is dependent upon funding, land availability, and landowner willingness to participate. If land above the McIntosh Fen area could be acquired, the assumption

is that this action would be expected to reduce the potential for long-term risk to the species and could contribute to conservation of the species.

Specific Management Area objectives, standards, and guidelines are expected benefit the *Salix serissima* occurrence at McIntosh Fen Botanical Area (MA 3.1):

- Objective 3.1-201 requires maintenance or enhancement of botanical features at Botanical Areas in Alternatives 1, 2, and 4. Monitoring to see if this target is being achieved has been added to the objective for Alternatives 3 and 6. For McIntosh Fen Botanical Area, this objective is tied closely with the monitoring that is specifically occurring for *Salix serissima.*
- Standard 3.1-4101 manages fire and fuel through control practices to protect values of Botanical Areas in Alternatives 1 and 2. For Alternatives 3, 4, and 6, Minimum Impact Suppression Tactics (MIST) must be used over more aggressive actions that could still be used for Alternatives 1 and 2. The assumption is that MIST fire suppression efforts would be expected to result in less intensive disturbances if a fire would occur within the McIntosh Fen Botanical Area, and would be expected to result in fewer direct and indirect impacts to *Salix serissima*.
- Guidelines 3.1-9101, 9102 and 9103 restrict vehicle use (including snowmobiles) to designated routes and prohibit off-road travel in all alternatives within the Botanical Area. For Alternatives 3, 4, and 6, these have been reworded to allow for emergency and administrative uses and are elevated to standards. Although current authorized snowmobile use is not documented to occur within the same area as *Salix serissima* individuals, the potential risk of impacts from snowmobiles leaving the designated route were recognized, and the guideline was elevated to a standard to reduce the risk of impacts to *S. serissima*.
- Standard 3.1-2501 allows livestock grazing within Botanical Areas only if it does not conflict with values for which the area was designated. Standard 2503 is included in all alternatives (with some wording differences) except Alternative 1, to further protect Region 2 Sensitive species from direct effects of livestock use by restricting access of livestock at sensitive plant locations. Livestock grazing is not currently authorized within the fenced portion of McIntosh Fen Botanical Area (Salix serrisima occurs within the fenced portion of the Botanical Area) and the assumption is that it is not expected to occur within the fenced portion of the McIntosh Fen Botanical Area at any time in the future; therefore no direct effects are expected to occur to *Salix serrisima* from this authorized livestock activity within the fenced portion of the McIntosh Fen Botanical Area.
- Guideline 3.1-2502 is included in all alternatives and allows for new improvements only when necessary to maintain, restore, or enhance the values for which the area was designated; therefore, minimal, if any effects to *Salix serissima* in the McIntosh Fen Botanical Area from new improvements would be expected.
- Standards 3.1-5101 and 5102 and Guideline 3.1-5103 provide for limited recreational uses of Botanical Areas when they do not threaten the values for which the Botanical Area features. Standard 3.1-9104 limits new road and trail construction to those needed for interpretive or education purposes or when needed to correct resource damage occurring from existing roads, trails or other uses. These standards provide for action that

could be expected to reduce potential future impacts to the long-term persistence if identified as risks during monitoring of *Salix serissima* under any of the alternatives.

4-1.1.2 Cumulative Effects

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

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives for this plant species is smaller then generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). The spatial area used for the cumulative effects analysis for *Salix serissima* primarily includes fourth level Rapid Creek watershed above Pactola Reservoir. This area was chosen because it encompasses the ecosystem components of where the four known occurrences are located. A larger area would include other geologic, lower elevation and warmer ecosystem components which generally includes a different suite of species than those that occur within McIntosh Fen, the upper portion of Castle Creek (above Deerfield Reservoir) and the other occurrence locations.

Based on the four currently known *Salix serissima* locations (three occurrences having less than 20 individuals) on land administered by the Forest and two verified occurrences on private land that may not be targets of conservation and are of unknown status, the species' future is considered to be precarious. Past and ongoing Forest activities targeting the conservation or enhancement of desired conditions at McIntosh Fen Botanical Area include purchasing the land from private ownership, restricting livestock use, planting rooted willow cuttings from McIntosh Fen plant material, treating noxious weeds, filling of drainage ditches (that were originally created while in private ownership) with organic material, burning adjacent lower side slope drainage margins to reduce conifer encroachment and stimulate aspen regeneration, installation of metal gates to prevent trespass livestock and off road vehicle use, and the implementation of sensitive plant species monitoring (USDA Forest Service 2005a, USDA Forest Service 2005b, Hornbeck et al. 2003a).

The sources of water for McIntosh Fen are from underground springs and adjacent Castle Creek. A significant issue for the species' long-term persistence at McIntosh Fen is that well over 50 percent of the perennial portion of Castle Creek, upstream of the fen, is privately owned (Hornbeck et al. 2003a). Various levels of private land development is occurring in many areas of the Black Hills, and is occurring close to Deerfield Reservoir, which is within a few miles of private land above McIntosh Fen. If future upstream human activities or private land development or diversions occur at levels that result in alterations to the hydrology above McIntosh Fen that could reduce the levels of saturated conditions at the Fen, or limit beaver reoccupation of Castle Creek, the long term persistence of *Salix serissima* could be at risk. It is important to recognize that natural catastrophic events that could affect saturated conditions of occurrence locations or place stress on willow plants, such as droughts, could be expected to offset or negate the effects of any current conservation management actions, or management actions, as they would be expected to occur under the Phase II Amendment alternatives.

Visual observations of stressed *Salix serissima* individuals at the Middle Boxelder Creek occurrence (located in 2002) indicates that a potential decline may be occurring at this location possibly due to changes in the water table and competition from invading woody conifer species (spruce). There is a limited amount of private land (approximately 0.5 mile distant) upstream of the drainage where *Salix serissima* occurs immediately adjacent to headwater springs of Middle Boxelder Creek. This private land occurs at the ephemeral portions of the top of the same watershed as the *S. serissima* occurrence. Based on the distance and ephemeral conditions, it is not known if, but is considered unlikely that private land activities would be expected to contribute any adverse or beneficial effects to the Middle Boxelder Creek *S. serissima* occurrence.

Activities and effects on *Salix serissima* were discussed in the section based on the current locations of designated ARC (refer to Map G-6 in Appendix G: ARC and WUI). This map is subject to change with the potential that more areas could likely be designated as ARC (see Appendix B of the FEIS for discussion of ARC and the WUI), with fuel-reduction actions to occur within an estimated 1.5 mile WUI circumference area around those designated areas. It is uncertain how this expected revision of the list will result in changes in placement of or levels of treatments around species occurrences and how effects would be expected to change.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Salix serissima*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6. Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *S. serissima* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.1.3 Determination and Rationale

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing (USDA Forest Service 20055c) is made for *Salix serissima* (autumn willow) for implementation of any of the Phase II alternatives**.** Because persistence of *S. serissima* is tenuous in the Black Hills, all Phase II alternatives contain objectives, standards and guidelines designed to conserve or enhance this species and its habitat. Restoration activities (such as reestablishment of beaver) may cause incidental injury to individual plants, but are fully expected to raise the likelihood of persistence for this willow. Alternative 3 provides the greatest benefit for this species because fuel reduction, plus hardwood and riparian shrubland restoration, could be focused on Middle Boxelder Creek and McIntosh Fen vicinities. Alternative 6 would also provide greater benefits for the species than Alternatives 1, 2, and 4, provided that fuel reductions, plus hardwood and riparian-shrubland restoration efforts, were implemented in drainages affecting the McIntosh Fen BA (e.g., actions within the WUI upstream and downstream from the fen). These activities would contribute to long-term establishment of beaver in the Castle Creek drainage, which would help maintain McIntosh Fen. Alternatives 3, 4, and 6 include as standards (mandatory) a number of measures that are guidelines (optional) in Alternatives 1 and 2. Alternatives 1, 2, and 4 take the least action specifically targeting conservation of the two known occurrences of *S. serissima*. In addition they target fewer acres of hardwood restoration for long-term beaver re-introduction, place a

greater emphasis on maintaining or favoring spruce instead of hardwoods, and target fewer acres of riparian shrubland restoration, all of which could otherwise benefit *S. serissima*.

Specifically, the above determination for *Salix serissima* (autumn willow) is based upon the following assumptions:

1. The determination is made for the remaining life of the 1997 Plan with associated amendments and determinations will be re-evaluated during any revisions to the Forest Plan (currently expected targeted revision Decision date is 2012).

2. The conservation objectives and protective standard and guideline direction listed above for the various alternatives will be applied or implemented as written. This includes the assumption that there will be successful implementation of restricting access of livestock from the Silver Creek and Middle Boxelder Creek locations.

3. Regardless of which alternative is selected, the currently fenced portion of McIntosh Fen Botanical Area that restricts livestock will not be authorized for livestock use in the future.

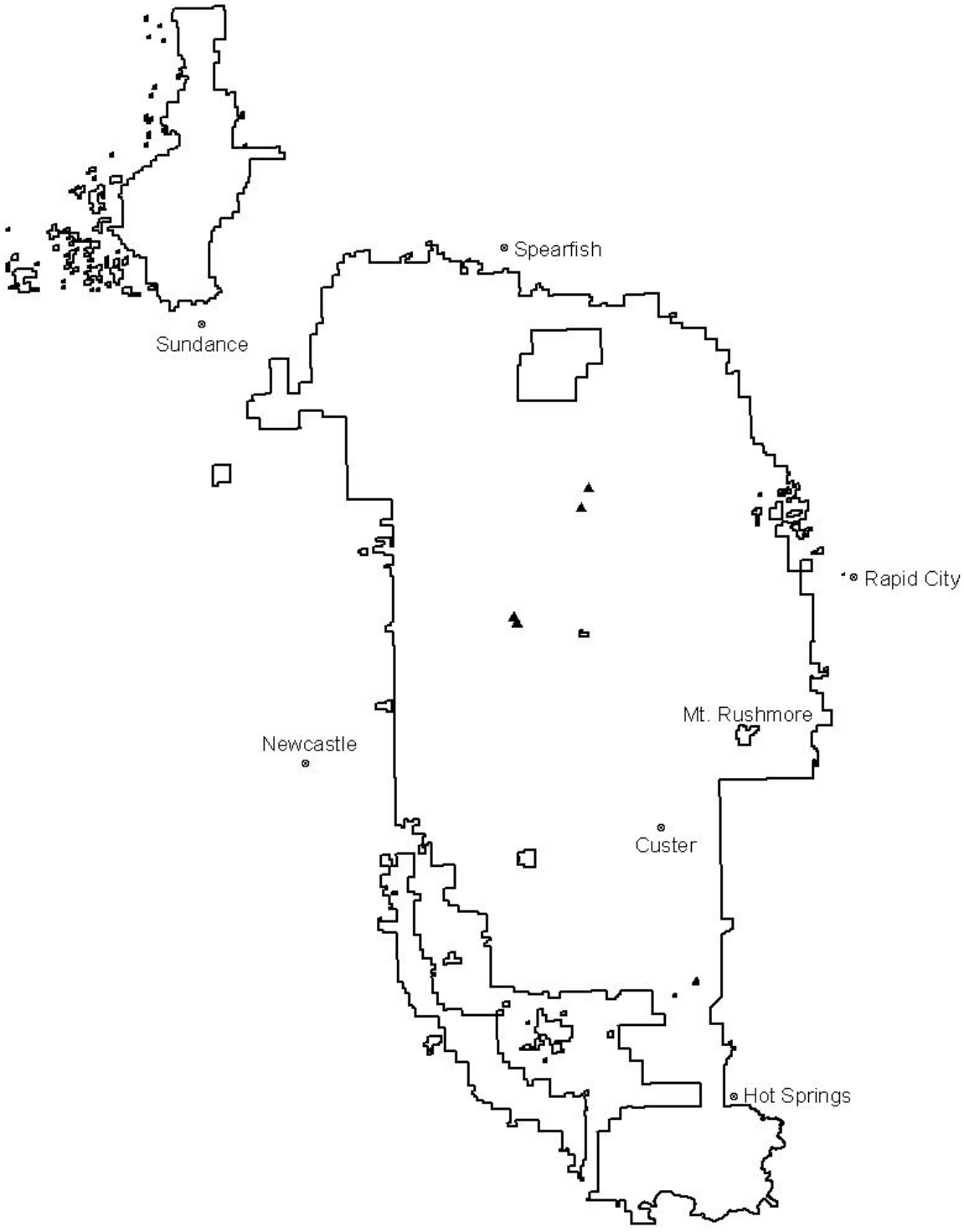
4. Regardless of which alternative is a selected, any sites supporting Region 2 Sensitive species such as *Salix serissima* occurrences are the first priority for treating noxious weeds.

5. That under any of the selected alternatives the species will be monitored according to the current monitoring protocol (or as altered through reassessment with the Rocky Mountain Research Station), which is designed to detect and respond in a timely manner to changes in the extent and condition of *Salix serissima* and habitat at McIntosh Fen Botanical area and the Middle Boxelder Creek Exclosure (USDA Forest Service 2005b).

6. That existing *Salix serissima* plants grown off site can continue to be used for rooted cuttings to successfully re-colonize all or portions of the two Black Hills National Forest occurrences in the event that all or portions of an occurrence may be lost.

7. That a small number of *Salix serissima* individuals will likely be impacted during long-term occurrence conservation efforts (e.g. willow foraging by beaver, collection of willow stems for propagation efforts).

Distribution of *Salix serissima* (Autumn Willow) on lands administered by the Black Hills National Forest



4-1.2. *Sanguinaria canadensis* (Bloodroot)

The Revised Forest Land and Resource Management Plan (LRMP) Biological Evaluation (BE) (USDA Forest Service 1996 Appendix H) and the LRMP Phase I Amendment BE (USDA Forest Service 2001c) give an overview of *Sanguinaria canadensis* distribution and natural history, and this information is incorporated by reference. However, based on the subsequent location of a number of new occurrences, plus baseline data collection and monitoring efforts that have occurred since 2000; more is known about the species occurrences and distribution in the Black Hills. This information was incorporated into an assessment for the species (Hornbeck et al. 2003b), which serves as a primary reference source for the following analysis.

Sanguinaria canadensis occurs in moist forests from Nova Scotia south to Florida and west to Manitoba and Kansas. The distribution of *S. canadensis* in the Black Hills is disjunct from the main portion of its range, with the closest occurrences in eastern South Dakota, Nebraska, and Kansas (Hornbeck et al. 2003b). In 2002, when the assessment was prepared (published spring 2003), 22 occurrences of *S. canadensis* had been documented on Forest lands in the northern and northeastern Black Hills in Lawrence and Meade Counties, South Dakota (Hornbeck et al. 2003b). More adjacent land has been surveyed during recent monitoring efforts (USDA Forest Service 2005b) since the assessment was prepared and some occurrences have been documented to be more extensive and as this happens locations may likely be combined into single larger occurrences (this will likely happen for sites numbers SACA13-2 and SACA13-6 in the Lost Gulch area). Currently known occurrences are located on the Northern Hills Ranger District and are dispersed across numerous separate watersheds.

The Forest *Sanguinaria canadensis* metapopulation was estimated to consist of at least 16,000 stems, with some occurrences exceeding 1,000 individuals (Hornbeck et al. 2003b). However, the abundance and distribution of this species may fluctuate in response to soil moisture conditions. As a result of surveys in 2001, estimated population levels are higher than those reported in earlier surveys (Hornbeck et al. 2003b). Some *S. canadensis* occurrences have a limited spatial extent but most are linear in nature, with nine of the occurrences having a linear length of one-half mile or greater, with 2004 spring surveys documenting an extension of an occurrence to 2.5 miles with approximately 10,000 individuals (USDA Forest Service 2004e). Occurrences are comprised of areas of scattered individual stems, scattered clumps of individuals or high concentrations of plants over a large area. The discovery of additional occurrences is likely, given that potential habitat remains to be surveyed (Hornbeck et al. 2003b).

The primary factor affecting the distribution of *Sanguinaria canadensis* in the northern and northeastern Black Hills appears to be the presence of hardwood forest habitats with sufficient soil moisture (Hornbeck et al. 2003b). Secondary factors possibly affecting its persistence in these habitats are beaver activity, upland tree densities and their effect on water inputs into streams, and the role of forest ants on *S. canadensis* dispersal. *S. canadensis* appears to be strongly influenced by light conditions, with more light availability resulting in more vegetative growth and increased reproduction (Hornbeck et al. 2003b).

Sanguinaria canadensis occurs within the following Forest Management Areas:

MA 3.31 – Backcountry Motorized Recreation Emphasis (Site numbers SACA13-26, SACA13-11, 95D010A)

MA 5.1 – Resource Production Emphasis (Site number SACA13-3)

MA 5.2A – Fort Meade VA Hospital Watershed (Site numbers SACA13-4, SACA13-5, SACA13-9, SACA13-12 – extends into MA 5.4, SACA13-17 – extends into MA 5.4).

MA 5.4 – Big Game Winter Range Emphasis MA – (Site numbers SACA13-1, SACA13-2, SACA13-6, SACA13-12 – extends into MA 5.2A, SACA13-13, SACA13-14, SACA13-17 – extends into MA 5.2A, SACA13-18, SACA13-19, SACA13-21, 95D030A, 95D040A, 950050B, 94BC30A, 94BC30C)

Sanguinaria canadensis is apparently secure in South Dakota but with some uncertainty in its status as indicated by the rank currently assigned by South Dakota (S4?) and is currently assigned a globally secure rank (G5) (Hornbeck et al. 2003b).

Sanguinaria canadensis is a perennial herb that produces a single kidney-shaped basal leaf and a single white flower, and is one of the earliest spring flowers to appear in the Black Hills. Likely pollinators include several species of bees and flies, but the importance of cross-pollination is not clear since the proportion of seed produced through self-fertilization is believed to be high. *S. canadensis* produces large numbers of seeds, which are modified for dispersal by woodland ant species. Ants are the only dispersal agents documented in the literature for this species, although flowing water also probably disperses seeds. Both sexual and vegetative reproduction (clonal growth) methods likely help to stabilize occurrences on the Forest. *S. canadensis* also requires a mycorrhizal fungus to thrive in the wild (Hornbeck et al. 2003)

In the Black Hills, *Sanguinaria canadensis* primarily occupies moist soils on floodplains, forested terraces, drainage bottoms, and north-facing slopes in open, rich hardwood plant communities (USDA Forest Service 2005a, Hornbeck et al. 2003b). *S. canadensis* appears to be most strongly associated with *Quercus macrocarpa*/*Ostrya virginiana* (bur-oak/ironwood,) forest; however, Forest occurrences are also located in *Crataegus douglasii-Crateagus chrysocarpa* (black hawthorne) shrubland and *Betula papyrifera* /*Corylus cornuta* (paper birch/hazelnut) forest that occur in moist (not saturated) drainage bottoms at elevations from 3,550 to 4,750 feet. Occurrences are also associated with accumulated debris and moist sediment in ponds behind beaver dams, which create similar conditions to the deep litter and moist, rich soil conditions, that *S. canadensis* is associated with elsewhere in its range (Hornbeck et al. 2003b).

4-1.2.1 Direct and Indirect Effects

Sanguinaria canadensis is the one of the most abundant Region 2 sensitive plants on the Forest, and is considered secure at this time. The two primary risks to its long-term persistence in the Black Hills have been identified as noxious weed or other plant invasion, along with their treatment, and high intensity wildfire (Hornbeck et al. 2003). Six weed species have been documented at, or immediately adjacent to, *S. canadensis* sites (USDA Forest Service 2005a). Many occurrences are next to roads, which makes them more vulnerable to invasion because

weeds infestations often start along roadsides. Uncharacteristically intense fires in dense conifer stands on uplands adjacent to many *S. canadensis* occurrences could adversely impact this species. Finally, the commercial value and local abundance of *S. canadensis* on the Forest makes it potentially vulnerable to over harvest, though no commercial collection has been documented yet (Hornbeck et al. 2003).

The persistence of *Sanguinaria canadensis* on Forest Service administered land is not currently at risk from livestock grazing, as nine sites are currently not grazed and one site is not accessible to livestock (Hornbeck et al. 2003b). Further, the 2001 survey noted little sign of grazing activity at *S. canadensis* locations in active grazing allotments. Based upon the current levels of livestock use, the number of locations where the species occurs, and the large numbers of plants at individual sites, the persistence of *S. canadensis* occurrences in the Black Hills is not currently at risk from livestock grazing at some locations. This is partially based on the assumption that vacant allotments will remain vacant in the future no matter which of the alternatives are selected. However, a general statement of risk from livestock use is difficult to make because the amount of livestock use and the conditions at the sites are variable. The plant may persist with livestock and wildlife use, as it is poisonous and presumably unattractive as forage, although trampling could damage the species shallow succulent rhizomes. However, *S. canadensis* is primarily concentrated in impenetrable wooded thickets, as evidenced by survey information (Hornbeck et al. 2003).

Timber harvest is generally not deemed a persistence risk to *S. canadensis* because occurrences are currently being avoided or measures are taken to minimize or reduce direct and indirect effects, or vegetative treatments may be designed to provide beneficial long-term indirect effects for the species (i.e. reduce risk from catastrophic events). However, it is still expected that associated road building activities and road maintenance activities may still result in some limited impacts.

The majority of the *S. canadensis* occurrences occur over various linear distances. Direct impacts to individuals may occur when various disturbance agents cross these linear occurrences. Various disturbances that may result in negative direct effects to individuals may include: individuals trampled by recreationists crossing drainages or individuals monitoring occurrences, livestock or wildlife crossing a drainage through an opening in a thicket, fire line creation that may cross one of the linear occurrences, fuel reduction activities within the Wildland Urban Interface (WUI), vegetation treatment to remove encroaching conifers to conserve and target regeneration of hardwood habitat associates where equipment may need to cross a drainage at a specified location, road or trail construction that may need to cross a drainage at designated sites, herbicide treatments, flooding of individuals by beaver reoccupation near *S. canadensis* occurrences, and *S. canadensis* individuals collected for herbarium vouchers or harvested by unauthorized collections. Indirect impacts to individuals or entire occurrences can include alteration or degradation of habitat conditions by invasion of noxious weeds and other invasive plant species, catastrophic fire, flooding events, or by fire suppression and the resulting increased density of conifers and decrease in light reaching the forest floor.

Recognizing noxious weeds and other invasive plants, and their treatment, as a primary risk to the species' long-term persistence on the Black Hills, conservation strategies and measures to address and reduce direct and indirect effects are given priority discussion in this section. All alternatives propose various levels of protection for Region 2 sensitive species from noxious-weed invasion and treatment. Objective 231 is included in all alternatives for the prevention and

reduction of noxious-weed invasion into native plant communities. In Alternatives 1 and 2 the objective is to treat 3,600 acres per year. Targeted treatment acres are increased to 6,000 acres per year in Alternatives 3, 4, and 8,000 acres in Alternative 6. Guideline 4303 revised the priority order in the action alternatives (Alternatives 3, 4 and 6) for treatment of weeds, and first priority of treatment is to occur at Region 2 Sensitive and Species of Local Concern plants and snails. Guideline 4304 (Alternatives 1 and 2) was revised and elevated to a standard in Alternatives 3, 4, and 6, to require treatment methods that pose the least risk to the species being protected. Alternatives 1 and 2 are silent on the monitoring of weed control effectiveness at Region 2 sensitive species sites to determine if weeds at those sites need to be re-treated throughout the season to reduce noxious-weed competition. Standard 4300-1 specifies this type of monitoring and was included in Alternatives 3, 4, and 6 to further address the risk that noxious weeds present to Region 2 plant species such as *S. canadensis*. Alternatives 1 and 2 require the use of certified noxious-weed-free seed, feed and mulch on the Forest (Standard 4306). This standard was revised in the action alternatives to require that the seed be tested at time of purchase to confirm that the seed is weed free. Mitigation of noxious-weed invasion into native plant communities by revegetating with native species is included under Guideline 1110 in Alternatives 1 and 2. The original guideline was revised and was elevated to a Standard 1110 in Alternatives 3, 4, and 6. Since noxious-weed occurrences and various other invasive species are becoming more prevalent on the Forest (USDA-Forest Service 2003b) and other land ownership, as well as being identified as one of the primary risks for *Sanguinaria canadensis* (Hornbeck et al 2003b), Alternatives 3, 4, and 6 are expected to have the lowest risk of indirect and direct negative impacts to *S. canadensis* from noxious weeds and their treatment.

As identified in the assessment (Hornbeck et al. 2003b), another primary risk to long-term persistence to *Sanguinaria canadensis* on Forest land is high intensity wildfire. Large-scale, stand replacing fires are a risk to extant bloodroot occurrences and the hophornbeam (*Ostrya virginiana*) forests that they occur in. Sites adjacent to continuous, dense stands of highly flammable conifers are particularly vulnerable. Further, stand-replacing fires have the potential effects of depositing large amounts of sediment in drainage areas, remove canopy cover, and kill individual plants. Therefore, intense wildfire could extirpate existing sites and reduce the amount of hophornbeam habitats, but where fire enhances the development of suitable hardwood habitats and *S. canadensis* seeds or rhizomes are present, the species can re-colonize the area (Hornbeck et al. 2003b). However, the fact that occurrences on National Forest land are dispersed across numerous separate watersheds greatly limits the likelihood of all occurrences being impacted by a single high intensity fire event. Because of the risk associated with high intensity fire events, Objective 200-05 was included in Alternatives 3 and 6 to target conservation of occurrences that could be at risk to high intensity wildfires by the creation or maintenance of conditions in the adjacent upland conifer stands that would be expected to increase the likelihood of dropping crown fires to the ground before reaching Region 2 sensitive plant species, such as *S. canadensis*. Alternative 3 is expected to provided the greatest likelihood of creating conditions that would be successful for dropping crown fires to the ground because it would create or maintain low crown fire hazard conditions near sensitive plant occurrences and botanical areas. A greater risk of crown fires affecting *Sanguinaria canadensis* is associated with Alternative 6 because it targets creation of a moderate to low crown fire hazard near those locations, instead of low hazard, therefore conditions for a higher intensity fire near emphasis plant species occurrences and associated effects to the plants could be expected to occur through implementation of Alternative 6, as compared to implementation of the objective for Alternative 3. Implementation of the

objective under either alternative near *S. canadensis* occurrences is expected to decrease fire effects (greater reduction under Alternative 3) and benefit the occurrences during fire events. This objective is not part of Alternatives 1, 2 or 4 therefore the greatest risk of high intensity fires, such as crown fires, to emphasis plant species would be expected to be associated with these alternatives. Since all or portions of six *S. canadensis* occurrences are located within the 1.5 mile WUI circumference area of ARC (Sturgis, Boulder Park, Galena, Deadwood, and Maitland ARC), it is likely that Objective 200-5 could be achieved near many of the occurrence locations in conjunction with fuel reduction efforts targeted for those communities (refer to Appendix G, Map G-6: At-risk Communities and Wildland Urban Interface) that is included in Alternative 6 (preferred alternative). However, in all reality, areas surrounding various ARC can be expected to receive treatment under all Phase II Amendment alternatives because of the tie to the legislation (refer to Appendix B of the FEIS for discussion of At-risk Communities and the Wildland Urban Interface for more information). There is a great deal of uncertainty on any effects statements regarding treatments around ARC and *S. canadensis* because without a priority system or a map indicating which ARC are targeted first or to what level, it is not known if any treatments would even occur within the immediate vicinity of occurrences. In addition, it is important to realize that in spite of efforts to reduce fuels or conifer encroachment to reduce the potential of high intensity or stand replacing fires, that fires can still occur, especially druing drought periods and could still result in indirect or direct impacts to the species.

Standard 3119 is included in Alternatives 3 and 6 to restrict the collection of sensitive plants (or parts thereof) to only those needed for scientific or educational purposes, or as recognized for American Indian traditions (Standard 7103). This would prohibit collecting for both personal (other than for American Indian traditional uses) and commercial uses, thereby limiting the associated direct effects of plants removed from occurrences. It is unknown how many plants would be used for American Indian traditional uses; however, they have indicated at meetings that their interests are in maintaining plant species that have traditional uses. Based on conversations at consultation meetings, *Sanguinaria canadensis* is a species of traditional use. Although uncertain, the assumption is that traditional uses and scientific collections may be expected to directly affect individual plants, it is not expected that this type of collection would present much risk to the overall long term persistence of this species on the Black Hills National Forest.

Objective 201 (Alternatives 1, 2, and 4) provides direction for conserving existing hardwood communities and targets restoration of historic hardwood communities by 10 percent (Alternatives 1 and 2) or 20 % (Alternative 4) over 1995 conditions. Alternatives 3 and 6 target doubling of the current existing aspen acreage and increasing bur oak by 33 percent during the life of the Plan. This objective is expected to benefit the species if the restoration treatments occur within the northern to northeastern portions of the Forest adjacent to *Sanguinaria canadensis* occurrences or in adjacent drainages that may have suitable microhabitats that have been encroached upon by conifers. In addition, these restoration activities could also prove beneficial for the long-term persistence of *S. canadensis* if they reduce the intensity of fires before they reach *S. canadensis* sites (e.g., reducing crown fires to less intense surface fires). Successful hardwood restoration activities that occur on the margins of meadows near streams could likely benefit beaver reoccupation or retention on streams adjacent to *S. canadensis* occurrences, thereby perpetuating the long term development and retention of a component of *S canadensis* habitat (Hornbeck et al 2003b).

Objective 200-01 was originally designed for Alternatives 3 and 6 to address a variety of risks associated with conifer encroachment for a number of the emphasis plant species. This objective has remained consistent in Alternative 3 and favors hardwood restoration where spruce has encroached into hardwoods. The removal of conifers at some of the northern *Sanguinaria canadensis* occurrences, with the intent of rejuvenating aspen for beaver reoccupation, may result in some short-term direct impacts to individuals by treatment activities and then by beaver establishment. However, restoration of some habitat conditions by beaver could be expected to be a beneficial effect to long term persistence of *S. canadensis*. In Alternative 6 (the preferred alternative), the objective was revised to more tightly manage for the retnetion of 20,000 acres of spruce across the Forest. The objecitve still mentions treating spruce where it has encroached into hardwoods and for emphasis species management (such as for *S. canadensis*), but as written it is uncertain whether this would indicate removing all encroachment trees from these areas, so little can be stated about any beneficial effects. Objective 200-01 is not included in Alternatives 1, 2, and 4. Alternatives 2 and 4 maintain existing patch size of white-spruce structural stages (Standard 3215), however, this standard was rewritten for Alternatives 3 and 6 and maintains tree canopy cover (assumed to be conifer canopy cover) which could significantly limit or prohibits hardwood restoration that could limit any benefits to *S. canadensis*. It is assumed that these canopy cover corridors could be placed at various locations and project designs could incorporate hardwood restoration thereby providing benefits to both marten and species that would be expected to benefit from hardwood restoration, such as *S. canadensis* under these alternatives. Alternative 1 does not specifically address the removal of spruce encroachment into hardwoods but also does not restrict that activity, therefore it is possible that the activity could take place to benefit *S. canadensis*.

Another Objective 200-04 was designed into Alternatives 3, 4, and 6 for the Phase II Amendment for conservation of species such as *Sanguinaria canadensis* where occurrences of the Black Hills population is expected to be at higher risk from loss to high severity or intense disturbance events. Objective 200-04 provides for the collection of material from Black Hills for reintroduction efforts into occurrence sites that were lost to these events, and where there it is likely that reintroduction efforts would be expected to be successful. No direction for collection of emphasis plant species material is included within Alternatives 1 and 2.

Guideline 2206 (was elevated to a standard in Alternative 2 during the Phase I amendment decision and continues to be included as a standard for Alternatives 3, 4, and 6) directs that no new developed recreation sites be placed in aspen/birch stands. This could be considered as a beneficial effect if any new developed recreation sites were proposed in the northern to northeastern Black Hills in the vicinity of *Sanguinaria canadensis* occurrences.

Although current levels of livestock use are not considered a risk to the persistence of *Sanguinaria canadensis* in the Black Hills, individual plants may be impacted. Guideline 2207 (Alternative 1) locates livestock/wildlife watering sites (i.e., drinking structures) outside of hardwood communities when feasible. The equivalent guideline in Alternative 2 does not include “when feasible.” The guideline was rewritten for Alternatives 3, 4, and 6 as a standard that locates new livestock/wildlife watering sites outside of hardwood communities “except when no other option is available.” Revision to a standard is expected to limit the likelihood of direct or indirect effects from livestock use to *S. canadensis* individuals.

Basic monitoring direction for Region 2 Sensitive Species is provided in FSM 2670 and Chapter 4 of the LRMP (1997). However, this direction does not specify the type and level of information that is needed in the monitoring. Monitoring is currently occurring for *Sanguinaria canadensis* and continues to document the presence and extent of bloodroot at designated monitoring sites on the Black Hills National Forest (USDA Forest Service 2005a, USDA Forest Service 2005b). Forest monitoring direction has been revised during this amendment process and is included in Chapter 4 of the LRMP, as amended by the Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction). Information on the current monitoring strategy for *S. canadensis* is available in the Forest Plan Monitoring Implementation Guide (USDA Forest Service 2005b).

None of the *Sanguinaria canadensis* occurrences are located within any of the candidate Research Natural Areas, and no beneficial or negative effects would be associated with any that may be designated under the various alternatives

Sanguinaria canadensis occurrences are located within Management Areas 3.31, 5.1, 5.2A, and 5.4. Although Forest wide direction has been changed as described above, very few changes are included in direction for these MAs for the action alternatives other than those that affect ponderosa pine structural stages. The assumption is that these would be designed to occur across planning unit areas, such as watersheds, and would not be expected to conflict with targeting reduction of fire risk near *S. canadensis* occurrences, and therefore would not result in any beneficial or negative effects to *S. canadensis*.

4-1.2.2 Cumulative Effects

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

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives for this plant species is smaller then generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). The spatial area used for the cumulative effects analysis for *Sanguinaria canadensis* primarily includes a portion of the very northern to northeastern Black Hills from approximately the False Bottom Creek watershed on the west to the Lead and Deadwood communities to the south, the Boulder Creek watershed to the east and the upper portion of the Little Elk Canyon watershed to the south and east. This area was chosen because it encompasses the ecosystem components of where the known occurrences are located. A larger area would include other geologic and higher elevation ecosystem components which generally includes a different suite of species than those that occur within the concentration areas for this species.

Historic downward trends in Black Hills habitat conditions (i.e. weeds, fire suppression, beaver reductions, conifer encroachment, urban development, and roads) have typically not been positive for the species, and a downward trend over historic conditions is considered likely.

Although *Sanguinaria canadensis* has recently been observed on private lands within the Black Hills (Hornbeck et al. 2003b), actions on the large proportion of private land in the Black Hills and their effect on potential *S. canadensis* occurrences at those sites are unknown. However, there is a high rate of development occurring on private lands in the northern and northeastern Black Hills as evidenced by new construction on those lands, some of which occur close to Forest *S. canadensis* occurrences. A reported occurrence of *S. canadensis* near the Boulder Canyon Highway has not been relocated in spite of intensive searches since 2000. It is unknown if it is because the wrong location information was provided or if reconstruction of the highway could have resulted in loss of the occurrence.

Public Law 107-206, Section 206 (2002) directs treatment to address fire and insect risk in the northeast corner of the Forest. The majority of the *Sanguinaria canadensis* occurrences are west of this area. There were no disturbances associated with legislative action documented to have occurred at any of the sites monitored in 2004 that occur near the legislative treatment area (USDA Forest Service 2005a).

Activities and effects on *Sanguinaria canadensis* were discussed in the section based on the current locations of designated At-Risk communities (refer to Map G-6 in Appendix G: At-risk Communities and Wildland-Urban Interface). This map is subject to change, with the potential that more areas could likely be designated as ARC (refer to Appendix B of the FEIS for discussion of At-Risk Communities and the Wildland-Urban Interface for more information), with fuel reduction actions to occur within an estimated 1.5 mile WUI circumference area around those designated areas. It is uncertain how this expected revision of the list will result in changes in placement of, or levels of treatments around species occurrences, and how effects would be expected to change.

There is no evidence of impacts to *Sanguinaria canadensis* by wildlife browsing, insects or disease in the Black Hills at this time (Hornbeck et al 2003, USDA Forest Service 2005a).

Although no impacts to the species has been noted recently from off road vehicle use (primarily ATV traffic), likely because of the dense thickets of shrubs where it often occurs, it is expected that there could be an increasing likelihood that individuals could be impacted by this activity. However some areas of the Forest are receiving greater levels of that use and more impacts have recently been noted associated with the increasing amounts off road vehicle activities. Therefore, it may be expected that any future increases in this activity in the Black Hills could also lead to direct adverse impacts of *S. canadensis* individuals wherever off road vehicle use may occur within a portion of any of the occurrences. The Forest is currently working on travel management plan to specifically address issues and effects associated with off road vehicle use.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Sanguinaria canadensis*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6. Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *S. canadensis* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.2.3 Determination and Rationale

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing (USDA Forest Service 2005c) is made for *Sanguinaria canadensis* for all Phase II alternatives**.** The rationale for this determination is that several standards and guidelines under each alternative address the various potential risks to this species, as described earlier. Other conservation strategies and measures that vary by alternative provide for conservation or enhancement of *Sanguinaria canadensis* habitat conditions, and *ex situ* collections of plant material are expected to be available for re-introduction if needed. Specifically, the above determination for *S. canadensis* is based upon the following assumptions:

1. The determination is made for the remaining life of the 1997 Plan with associated amendments and that determinations will be re-evaluated during any future amendments or revisions to the Forest Plan (currently expected targeted revision Decision date is 2012).

2. That all conservation objectives and protective standard and guideline direction listed above for the various alternatives will be fully applied or implemented as written.

3. That regardless of which alternative is selected, the species will be monitored according to the current monitoring protocol (or as altered through reassessment with the Rocky Mountain Research Station), which is designed to detect and respond in a timely manner to changes in the extent and condition of *Sanguinaria canadensis* occurrences (USDA Forest Service 2005b).

4. Regardless of which alternative is a selected, any sites supporting Region 2 Sensitive species such as *Sanguinaria canadensis* occurrences are the first priority for treating noxious weeds.

5. That regardless of which alternative is selected, any allotment supporting *Sanguinaria canadensis* occurrences that are currently vacant will remain vacant.

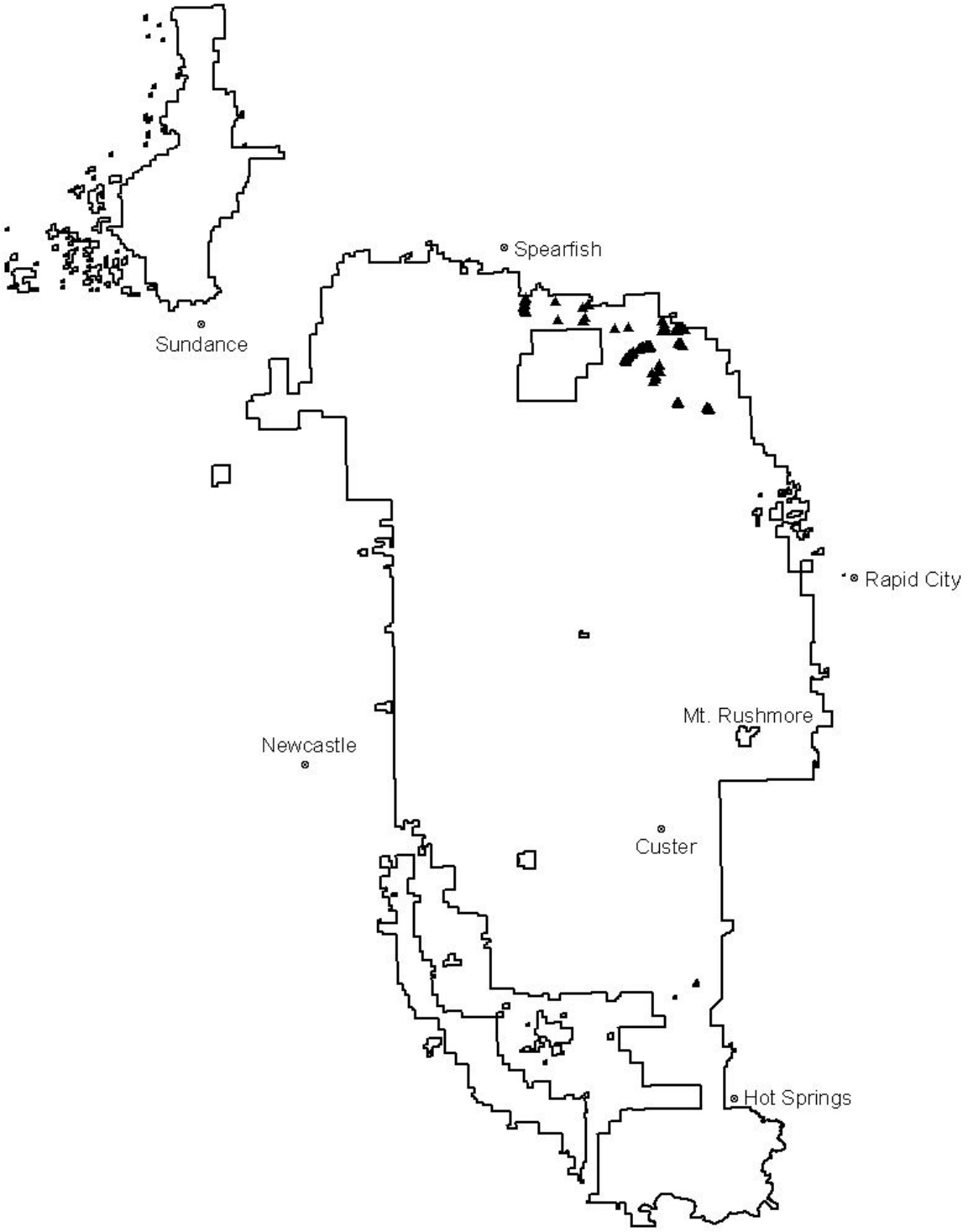
6. That plant material collected on the Forest can be used to successfully re-colonize all (or portions of) core *Sanguinaria canadensis* occurrences in the event such sites are lost.

7. That a limited number of *Sanguinaria canadensis* individuals are likely to be impacted from road maintenance, conservation efforts targeted for other species, and other disturbances such as large-scale, high intensity wildfires; but given the distribution of occurrences among several geographically disjunct sites, it is very unlikely that all individuals at all occurrences will be impacted by a single disturbance.

8. That in spite of the conservation practices the Forest may use, this plant occurs in areas that have been periodically intensively impacted over many years by activities the Forest cannot control, such as highway construction or maintenance and the use of exotic

invasive plants in roadside seeding. The monitoring strategy is designed to detect and respond in a timely manner to impacts to the species and its habitat, but not all impacts can be prevented.

Distribution of *Sanguinaria canadensis* (Bloodroot) on lands administered by the Black Hills National Forest.



4-1.3. *Carex alopecoidea* (Foxtail Sedge)

The Revised Forest Land and Resource Management Plan (LRMP) Biological Evaluation (BE) (USDA Forest Service 1996a) and the LRMP Phase I Amendment BE (USDA Forest Service 2001c) give an overview of *Carex alopecoidea* (foxtail sedge) distribution and natural history, and this information is incorporated by reference. However, based on the location of a number of new occurrences, baseline data collection and monitoring efforts that have occurred since 2000, more is known about the species occurrence and distribution in the Black Hills.

Carex alopecoidea is widely distributed from eastern to central Canada, the Northeastern United States, the Great Lakes region south to Tennessee, and west to North Dakota (Flora of North America 2002) and the Black Hills of South Dakota and Wyoming (NatureServe 2004). The Forest has recently (2001 - 2003) obtained a great deal of occurrence information for *C. alopecoidea* within the Black Hills. Over 3600 clumps of *C. alopecoidea* have been counted on the Black Hills National Forest since 2001 from 29 different sites. The number of individuals at the sites ranges from one to over 800. Data has been collected on the 32 known occurrences of *C. alopecoidea* on Black Hills National Forest administered land in Lawrence County, South Dakota and Crook County, Wyoming between 2001 and 2004 (USDA Forest Service 2004c, USDA Forest Service 2005a). All occurrences except two were discovered between 2001 and 2003.

While *Carex alopecoidea* appears to be limited to two regions in the Black Hills, it does occur within four different Forest designated Management Areas (MA):

> MA 3.1 – Botanical Areas – (Dugout Gulch and Sand Creek Botanical Areas) – Approximately 6 percent of the occurrences are located within this MA.
>
> MA 4.1 – Limited Motorized Use and Forest Product Emphasis – Approximately 9 percent of the occurrences are located within this MA.
>
> MA 5.1 – Resource Production Emphasis – Approximately 56 percent of the occurrences are located within this MA.
>
> MA 5.6 – Forest Products, Recreation and Big Game Emphasis – Approximately 22 percent of the occurrences are located within this MA.
>
> Due to the linear nature of many foxtail sedge occurrences, some sites extend from one MA boundary into another MA (approximately 9 percent): One occurrence extends from MA 4.1 into MA 5.1, and two occurrences extend from MA 5.1 into the boundary of MA 5.6

Forest *Carex alopecoidea* occurences are distributed within six watersheds: Crow Creek watershed in western Lawrence County, South Dakota (11), the Sand Creek watershed in eastern Crook County, Wyoming (14), Beaver Creek watershed in the Bearlodge Mountains in Crook County, Wyoming (4), Blacktail Creek in the Bearlodge Mountains, Crook County, Wyoming (1), Shepard Gulch in eastern Crook County, Wyoming (1) and Lower Spearfish Creek in Lawrence County, South Dakota (1).

All occurrences of *Carex alopecoidea* are located within eight currently active grazing allotments, with over half of the occurrences located within the Cement Ridge allotment located on the Wyoming-South Dakota. Two of the 32 occurrences are located in Forest designated Botanical Areas (Management Area 3.1) within allotments, but documentation does not indicate that any current grazing activity is located within that portion of the allotments.

Carex alopecoidea is currently assigned a rank of imperiled because of rarity (S2) in both South Dakota and Wyoming. The species is considered to be demonstrably secure based on the assigned global rank (G5) (NatureServe 2005a).

Carex alopecoidea is a perennial graminoid with stout culms 16 to 31 inches tall. Drainages on the Forest where *C. alopecoidea* is found are often associated with active or ancient beaver dams (Black Hills National Forest Data 2003). It is suspected that *C. alopecoidea* may be a disturbance dependent species due to its patchy distribution in apparently suitable habitat conditions and that the majority of the known occurrences are located at beaver created disturbance locations; however, its associated habitat condition preferences on the Black Hills National Forest are not well understood (USDA Forest Service 2000, USDA Forest Service 2005d).

The documented associated habitat conditions at occurrences throughout *Carex alopecoidea*'s range includes seasonally saturated meadows, openings in alluvial woods and stream banks, usually over calcareous substrates (Flora of North America 2002). The majority of currently known Black Hills occurrences have been documented along the upper headwaters of low-gradient perennial streams, with the majority of the occurrences associated with old beaver dams and ponds (little or no ongoing beaver activity) where flooding and disturbance have created wet to moist meadow habitat conditions. Black Hills *C. alopecoidea* sites are most often open, with little to no canopy cover and are located at elevations between 4,100 and 6,400 feet. Occasionally, a few individuals at some occurrence locations extend into areas scattered with willows, hawthorn, hazelnut, or spruce trees. Documentation for the majority of the sites indicates that *C. alopecoidea* individuals occur primarily in the transitional areas between saturated soils and the immediately adjacent mesic upland areas, and individuals are often found on the downstream side of old beaver dams. Individuals at the 2003 discovered private land low-elevation occurrence (north of the Dugout Gulch BA) occur within the saturated riparian zone.

4-1.3.1 Direct and Indirect Effects

As with most riparian species, altered hydrology from current conditions can be expected to likely present the most risk to the species' long-term persistence. Altering the hydrology to a wetter or drier condition may result in a shift, reduce the size of, or eliminate occurrences, but a change may also create additional habitat conditions for *Carex alopecoidea* by establishing appropriate conditions at sites that were previsously too dry or too wet. Invasion by noxious weeds or other competitive non-native invasive plants would be expected to result in negative effects to *C. alopecoidea*. Baseline data collected at all currently known occurrences document occurring livestock use at most of the known *C. alopecoidea* occurrences (USDA Forest Service 2005d), but the effects to the species associated with livestock is not well understood. *C. alopecoidea* in the Black Hills exists under current levels of grazing, as most occurrences are in active allotments, but since pre-grazing data for cattle is unavailable it is uncertain if the numbers of *C. alopecoidea* individuals at occurrences have remained the same, decreased or increased

with that use. The majority of the *C. alopecoidea* sites are linear in nature (associated with the linear shape of streams) vary in distance length along the streams where they are located. Direct effects to individuals may occur when various disturbance agents cross these linear occurrences. Many sites have roads that cross or parallel streams where occurences are located, so impacts associated with vehicle travel or off road vehicle use may be expected to impact *C. aopecoidea* individuals at occurrences.

Various disturbances that may result in negative direct effects to individuals may include: livestock or wildlife crossing a drainage, fire line creation that may cross one of the linear occurrences, fuel reduction activities within the Wildland Urban Interface (WUI) (see Phase II FEIS glossary), vegetation treatment to remove encroaching conifers to conserve and target regeneration of hardwood habitat associates where equipment may need to cross a drainage at a specified location, road or trail construction that may need to cross a drainage at designated sites, herbicide treatments, flooding of individuals by beaver reoccupation near *Carex alopecoidea* occurrences, individuals trampled by recreationists crossing drainages or individuals monitoring occurrences, and *C. alopecoidea* individuals collected for herbarium vouchers. Indirect effects to individuals or entire occurrences can include alteration or degradation of associated habitat conditions by invasion of competitive noxious weeds and other invasive plant species, altered hydrologigal conditions, flooding events or sedimentation as a result of a disturbance event such as from a high intensity fire event occurring on adjacent conifer uplands.

A variety of objectives, standards and guidelines are incorporated into one or more of the Phase II Amendment alternatives that when implemented are expected to to reduce or eliminate various effects to riparian and wetland ecosystems. Objective 214 calls for an increase in riparian shrub community restoration by 500 acres in Alternatives 1, 2, 4 and 6 (the designated preferred alternative). Alternatives 3 targets the restoration of 1000 acres of riparian shrubland. This objective may not directly conserve sites of *Carex alopecoidea* and may result in some negative effects to some individuals in the short term if located in the immediate area of *C. alopecoidea* occurrences since *C. alopecoidea* associated habitat conditions are documented to have open canopy conditions, or very low amounts of a shrub or tree canopy. Therefore, increasing riparian shrub communities in the immediate area may not be a benefit to this species. However, in the long term, restoration of shrubs would be expected to enhance habitats for suitable beaver reoccupation of a site, thereby continuing to create a cyclical type of disturbance that would be expected to provide reoccurring associated habitat conditions for *C. alopecoidea* colonization and establishment expansion of adjacent occurrences.

There are some seeps and springs are located on sideslopes or along small side drainages above stream systems in the vicinity of the some *Carex alopecoidea* occurences. Guideline 3104 provides for the conservation of sensitive species habitats when springs or seeps are developed as water facilites in Alternative 1. In Alternative 2, development of springs and seeps as water facilities is prohibited. Alternatives 3 and 6 alters Guideline 3104 to a Standard, and includes Species of Local Concern while prohibiting the development of springs and seeps as water facilities unless that development mitigates an existing risk. In Alternative 4, this guideline also becomes a Standard, and areas where moist soil conditions exist should be avoided or conserved, and development of springs or seeps where sensitive species exist would be prohibited. By altering 3104 to a standard in the alternatives except Alternative 1, it lends more assurance to implementation with greater expectations that effects to springs and seeps would be less in

Alternatives 2, 3, 4 and 6 as compared to Alternative 1. Therefore, the assumption is that there would be a greater likelihood in those Alternatives that hydrologic function of seeps and springs would be conserved, thereby allowing for the continued contribution of moisture to stream systems and long term persistence of where *C. alopecoidea* occurs.

All alternatives include conservation and protection for sensitive plant species and their habitats during and after trail, road and highway construction. Guideline 3107 in Alternatives 1, 2, and 4 was designed to eliminate or mitigate adverse effects to sensitive plant occurrences. Alternatives 3 and 6 (the designated preferred alternative) place more emphasis on this through rewording and strengthening to a standard (and wording has been moved to Standard 3106)and limits the types of disturbances that can occur with construction activities. Guidelines 9107 and 9108 prohibit land vehicles from entering riparian areas except at specified crossing areas, and vehicles, except snowmobiles, are limited to roads and trails in riparians areas in Alternative 1. Again, this conservation measure is strengthened to standards (assumption is that deviation requires amending the LRMP) in Alternatives 3 and 6. Standards are expected to provide more assurance of full implementation, with greater expectations that effects to riparian systems would be lower. Expectations are that full implementation of this direction at any of the known *Carex alopecoidea* locations are likely to result in minimal effects to the species.

Another potential risk to the long term persistence of *Carex alopecoidea* could be from plant competition associated with noxious weed invasion. Noxious weeds have been documented adjacent to, or within all but one of the currently documented occurrences of *C. alopecoidea*. In additon, some of the adjacent locations of weeds occur within the same ecological type as this sedge. As with other Region 2 Sensitive plant species associated with riparian systems, a primary concern would be the invasion of purple loosestrife into areas where *C. alopecoidea* is located. Purple loosestrife is not currently documented to occur at any of the *C. alopecoidea* sites (USDA Forest Service 2004b, 2005a) or anywhere close by but if it invades any of the areas, it is very aggressive and has the potential to impact wetland sites and their associated plant species. The current monitoring design for *C. alopecoidea* includes the detection of noxious weeds and other non-native invasive plant species (USDA Forest Service 2005a).

All alternatives target various levels of conservation and protection of designated Region 2 Sensitive species from noxious weed invasion and treatment. Objective 231 is included in all alternatives to target prevention and reduction of noxious weed invasion into native plant communities. In Alternatives 1 and 2 the targeted objective is to treat 3,600 acres per year. Targeted treatment acres are increased to 6,000 acres per year in Alternatives 3 and 4. The designated preferred alternative, Alternative 6, increases the minimum number of targeted weed treatment acres in this objective to 8,000. In Alternatives 3 and 6, Guideline 4303 was revised to make the highest priorty for weed treatment to occur at Region 2 Sensitive and Species of Local Concern plants and snails. Under Guideline 4304 in Alternatives 1 and 2, individual weeds are to be treated whenever practical, rather than broadcast spraying. Additional emphasis on this is placed in Alternatives 3, 4, and 6 by changing 4304 to a Standard and changing the direction to focus on protection of R2 Sensitive and Species of Local Concern plants and incorporating direction for requiring treatment methods that pose the least risk to the species being protected. Alternatives 1 and 2 (No Action Alternatives) do not include direction for monitoring weed control effectiveness at Region 2 Sensitive species sites. The Phase II Amendment Action Alternatives (3, 4 and 6) include Standard 4300-1 to implement monitoring of these treatments to

determine if treatments were successful or if weeds need to be retreated throughout the season to reduce or eliminate noxious weed competition risks at those occurrences. Alternatives 1 and 2 require the use of certified noxious weed free seed, feed and mulch on the Forest (Standard 4306). This standard was revised for the Phase II Action Alternatives (3, 4 and 6) to require that seed that is to be planted on the Forest be tested at time of purchase to confirm that the seed is weed free. Mitigation of noxious weed invasion into native plant communities by revegetating with native species is included as a Guideline (1110) in Alternatives 1 and 2. In Action Alternatives 3, 4, and 6, the Guideline was strengthened to a Standard (slightly different wording in each alternative) and provides for the prevention of noxious weed invasion through the use of native species revegetation and prohibiting the use of aggressive non-native perennials and limits the use of alflafa to the most disturbed sites where topsoil is not available (such as in the case of old mine sites or highway construction zones). Therefore it is expected that since Alternatives 3, 4 and 6 take a more aggressive approach for preventing and taking action against noxious weeds in the vicinity of Region 2 Sensitive plant species occurrences, full implementation of those alternatives would result in the lowest level of adverse indirect and direct effects associated with noxious weeds and their treatment, and would be expected to have the least risk associated with noxious weeds and non-native invasives associated with the long term persistence of *Carex alopecoidea* as compared to noxious weed impacts under implementation of the No Action Alternatives (Alternatives 1 and 2).

Livestock use occurs at most sites where *Carex alopecoidea* has been located, and specific indirect and direct effects that may be realized to this species would be expected to depend on the degree and intensity of actual grazing, trampling, trailing, water structure access and other use of its riparian habitats; however, the plant itself is not considered to be preferred forage (USDA Forest Service 2000c) by livestock. It is unclear and unknown if grazing may be detrimental, beneficial, or has no effect since some of the largest *C. alopecoidea* occurrences are located in intensively grazed locations on the Black Hills National Forest. Currently, the trend of the species at these occurrences are unknown (USDA Forest Service 2004b) since data for a number of these recently discovered occurrences were only available for the last few years, and in addition, occurrence, distribution, and abundance of *C. alopecoidea* prior to the start of historical cattle grazing is not available. Therefore, no trend statement with regard to grazing can currently be made. In addition, livestock grazing is subject to the project level NEPA analysis process, which generally includes conservation and protection at the allotment level such as avoidance and mitigation for Region 2 Sensitive plant species such as *C. alopecoidea*. As well as the NEPA process, administration of livestock grazing permits utilize Annual Operating Instructions which would be expected to include monitoring instructions for identified “key areas” or “key species” (which would be expected to include sensitive plant occurrences that occur within allotments), and implementation of this monitoring and moving livestock based on that monitoring would be expected to further limit adverse impacts to sensitive species, such as *C. alopecoidea*. *C. alopecoidea* has been given emphasis by Objective 200-10 in Action Altenatives 3 and 4, and as a Standard (2505f) in Alternative 6 (designated as the preferred alternative) by requiring the avoidance by livestock the the implementation of restricting livestock grazing or use on all or portions of five geographically spaced occurrences of *C. alopecoidea* (at occurrence site numbers CAAL8-19, CAAL8-20, CAAL8-22, CAAL8-30 and CAAL8-31). Full implementation immediately of the exclusion of livestock would be expected to limit direct effects associated with livestock consumption and trampling at these five sources and the assumption is these could be expected to provide reproductive material (seed) that could

be conserved and available for site recolonization or site expansion. Guidelines 2505 and 2505d in Alternatives 1, 3, and 4, direct the level of grazing in riparian areas to be managed by the project level Allotment Management Plan (AMP) or through the project level Annual Operating Instructions (AOI) to permitees, based on range conditions, season of use, and the residual height of key species (such as *C. alopecoidea*). Guideline 2505 is strengthened to a standard in Alternatives 2, 3 and 6. Guideline 2505c in Alternatives 1, is a standard in Alternatives 2, 3, 4 and 6, and limits grazing to 40 percent of the leaders produced during the year (this will require active monitoring), which would also be expected to limit the adverse effects of plant trampling and potential alterations to hydrologic function that may result from the prolonged presence of cattle or other livestock use. Guideline 2507 in Alternative 1 and Standard 2507 in Alternative 2 and 4 specifies the level of use during grazing to not more than 50 percent of the current growth of forage before August 1 and to no more than 30 percent of the current growth after August 2 in Alternative 1. In Alternatives 3 and 6, 2507 is strengthened to a standard and allows grazing in riparian areas only as long as it meets the objective of maintaining, enhancing, or conserving the conditions of the riparian ecosystem and emphasis species persistence. It is assumed that implementation would be expected to include early removal of livestock use or not occur at all in those locations if needed to target conservation of emphasis species persistence at those sites, therefore it is assumed that if implemented as described, Alternatives 3 and 6 (designated preferred alternative) could be expected to provide more conservation for riparian associated species, such as *C. alopecoidea*, followed by Alternative 4 and Alternative 2, with the most risk to species likelihood of persistence with livestock use associated with Alternative 1.

Objective 200-04 was designed into Alternatives 3, 4, and 6 for conservation of species expected to be at risk from high intensity disturbance events, whether natural or human-induced. This objective provides for the collection of emphasis plant species material from the Black Hills for reintroduction efforts if needed. No direction for collection of such material is included as a conservation in the Phase II Amendment No Action alternatives (Alternatives 1 and 2). Based on the number of *C. alopecoidea* occurrences located in the Black Hills, it is likely that reintroduction materials for this species could also potentially be collected from nearby *C. alopecoidea* occurrences, such as from those that are to be restricted from livestock access (see discussion above). Successful reintroduction efforts would be expected to minimize the effects of lost occurrences where it is determined that sites would not be likely to recolonize naturally.

Objective 221 targets conservation or enhancement of habitat conditions for sensitive species, and is included in all Phase II Amendment Alternatives (Alternatives 1, 2, 3, 4, and 6), therefore the expectation that Forest activities and projects that are located in or near *Carex alopecoidea* occurrences would be implemented in such a way as to conserve or enhance those occurrences under any of the action alternatives. Standard 3115 requires that a sensitive species located after contract or permit formation be appropriately managed through active coordination in all alternatives. It is assumed that implementation of this standard will keep potential adverse effects to a minimum at new discovered locations. All alternatives include Guideline 8101 and 8102, which targets habitat for Region 2 Sensitive species and riparian areas as a priority in considering lands for acquisition. If land acquisition occurs in areas where *C. alopecoidea* is located then acquisition could be expected to benefit *C. alopecoidea* by likely reducing the potential for effects associated with development activities (such as highways or multiple access roads, associated road culverts, buildings, wells, septic systems, etc.) and alterations to the

hydrologic functions of riparian systems that are associated with those types of activities (see section 3-2.3 Riparian and Wetland Ecosystems).

Carex alopecoidea is currently known from two primary geographic areas within the Black Hills. At this time, the species is not known to be sought by private collectors or for commercial trade. Baseline data do not include any evidence of plant collecting in *C. alopecoidea* locations (USDA Forest Service 2005d). While collection is not known or not considered to be much of a risk (does not have showy flowers, is not an orchid, not known to be targeted for medicinal uses) to this species long term persistence in the Black Hills, the likelihood of any potential effects from collection are limited through Forest Service Manual direction (FSM 2673.2) regarding restrictions of collecting designated Region 2 Sensitive plants, and is applicable irregardless which of the alternatives are selected. This direction is further clarified in Standard 3119 which is included in Alternatives 3 and 6 to restrict the collection of sensitive plants (or parts thereof) to only those needed for scientific or educational purposes, or as recognized for American Indian traditions (Standard 7103). This would prohibit collecting for both personal (other than for American Indian traditional uses) and commercial uses, thereby limiting the associated direct effects of plants removed from occurrences. It is unknown how many plants would be used for American Indian traditional uses; however, they have indicated at meetings that their interests are in maintaining plant species that have traditional uses. While total amount collected as a traditional use is not currently known and it is not known what level may be collected in the future, consultation on American Indian Traditional Use (Standard 7103) of Region 2 Sensitive plants as required by Standard 7103 in Alternatives 3 and 6 is expected to limit potential adverse effects to the species. Standard 7103 is not included in Phase II Amendment Alternatives 1, 2 and 4.

Because 12 of the *Carex alopecoidea* occurrences are located entirely within the 1.5 mile Wildland Urban Interface (WUI) circumference area of At Risk Communities (ARC) as currently designated (Potato Creek), and two other sites are partially included within the WUI circumference area of ARC, it is expected that adjacent land areas will be targeted for fuel reduction efforts (see Appendix G, Map G-6: At-risk Communities and Wildland Urban Interface) in Alternative 6. However, various WUI areas can be expected to receive treatment under any alternative selected because of the tie to fuels reduction legislation (see Appendix B section 2.3 At-Risk Communities and Wildland-Urban Interface). There is a great deal of uncertainty on any effects statements regarding fuel reduction treatments around designated ARC and *C. alopecoidea* occurrences because without a priority system or a map indicating which ARC are targeted first or to what level, it is not known if any treatments would even occur within the immediate vicinity of occurrences. If future fuel reduction activities are targeted at restoring riparian areas and hardwood restoration near the *C. alopecoidea* occurrences, some short term impacts or effects would be expected; however, long term beneficial effects may include alterations to habitat conditions that could support beaver reoccupation. Since beaver feed primarily on hardwoods this could be expected to restore, create or enhance some saturated and mesic soil moisture habitat conditions for *C. alopecoidea*.

Basic monitoring direction for Region 2 Sensitive Species is provided in FSM 2670 and Chapter 4 of the LRMP (1997). However, this direction does not specify the type and level of information that is needed in the monitoring. Monitoring is currently occurring for *Carex alopecoidea* and continues to document the presence and extent of *C. alopecoidea* at designated monitoring sites

on the Black Hills National Forest (USDA Forest Service 2005b). Forest monitoring direction has been revised during this process and is included in Chapter 4 of the LRMP, as amended by the Phase I amendment and through this Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction for Region 2 Sensitive Species). Information on the current monitoring design for *C. alopecoidea* is available in the Forest Plan Monitoring Implementation Guide (USDA Forest Service 2005b).

Due to its frequent occurrence near current or historic beaver activity, the inactive and active beaver ponds at the candidate Geis Spring Research Natural Area (RNA) may contain extant, but undocumented *Carex alopecoidea* occurrences, or at a minimum provide suitable associated habitat conditions for this species. Phase II Amendment Alternatives 3, 4, and 6 (preferred alternative) include Geis Spring as a candidate RNA. The Sand Creek and Cranberry Springs candidate RNA sites are included in Alternative 4 and are located at the outer edge of the known range of *C. alopecoidea* occurrences in the northern Black Hills. No occurrences of *C. alopecoidea* are documented within the boundaries of these two candidate RNA sites but occurrences are located within approximately ½ mile of the boundary of the Sand Creek candidate RNA location. Other candidate RNA sites are not located near the known range of *C. alopecoidea* on the Black Hills or do not include associated habitat conditions that are often located at known occurrence locations. Because designation of a site as an RNA generally restricts management that occur within its boundaries to chiefly natural processes or limited restoration activities (see Management Area 2.2 direction), and if Geis Spring, Sand Creek or Cranberry candidate RNA sites may be ultimately designated as RNAs they could potentially provide some longterm benefits for *C. alopecoidea* based on the restriction of a number of activities and associated effects (such as from road construction and reconstruction, off-road vehichles, timber harvest, etc.). Although unknown, future rare plant surveys within these candidate RNA boundary locations could potentially result in discoveries of previously unknown *C. alopecoidea* occurrences. Beaver occupation or reoccupation of an area within a candidate RNA boundary site may have direct adverse effects on *C. alopecoidea* individuals or sites, but it is considered likely that beaver would be expected to create long term suitable habitat conditions for this species that could benefit the likelihood for this species long term persistence on the Black Hills National Forest. No candidate RNAs are included in the No Action Alternatives (Alternatives 1 and 2) so no changes would be expected under those alternatives.

Activities and potential expected effects to *Carex alopecoidea* were discussed in the section based on the current locations of designated ARC (refer to Map G-6 in Appendix G: At-risk Communities and Wildland-Urban Interface). The designated list of ARCs (and associated map) is subject to change, with the potential that more areas could likely be designated as ARC (refer to Appendix B of the FEIS for discussion of At-risk Communities and the Wildland-Urban Interface for more information), with fuel reduction actions to occur within an estimated 1.5 mile WUI circumference area around those designated areas. It is uncertain how this expected revision of the list will result in changes in placement of, or levels of treatments around species occurrences, such as *C. alopecoidea*, and how effects would be expected to change.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Carex alopecoidea*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6.

Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *C. alopecoidea* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.3.2 Cumulative Effects

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

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives for this plant species is smaller then generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). The spatial area used for the cumulative effects analysis for *Carex alopecoidea* primarily includes a portion of the northwestern portion of the Black Hills and the Bearlodge Mountains. This area includes a portion of the fourth level Redwater River watershed that is located in the immediate vicinity of Cement Ridge near the Wyoming and South Dakota boundary line and the smaller Dugout Gulch watershed to the north within the larger watershed, as well as a portion of the central Bearlodge Mountains that is located north of Sundance, Wyoming. This area was chosen because it encompasses the ecosystem components of where the known occurrences are located, and that occurrences are not known to occur elsewhere on the Forest.

Well over 50 mines and claims are or were located in the general vicinity of *Carex alopecoidea* occurrences in the northern Black Hills. Many of these are located on adjacent private property. Few mines or prospect claims are recorded around the *C. alopecoidea* locations in the Bearlodge Mountains. The role historic mining may have had in *C. alopecoidea*'s current distribution in the Black Hills is uncertain. Despite its apparent colonization of disturbed habitats, it is possible that the species may be negatively impacted by mining activity in the northern Black Hills (USDA Forest Service 2000c). However, while mining may have impacted existing occurences, it may also have created additional suitable habitat conditions where mining operations took place in riparian areas, possibly by creating the open canopy conditions that this species is currently most often being discovered within.

Due to the species' potential association with beaver disturbance created habitat conditions, hardwood conservation and restoration that would be expected to take place adjacent to some of the *Carex alopecoidea* occurrences would be expected to benefit the reoccupation of beaver in some of those locations, thereby being expected to contribute to the maintainence or restoration of long term associtated saturated and open canopy conditions capable of conserving or providing habitat for *C. alopecoidea.*

A number of *Carex alopecoidea* sites occur immediately adjacent to private land, and individuals have been documented both upstream and downstream of private land (USDA Forest Service 2005d); therefore, it is considered likely that *C. alopecoidea* individuals also occur on these

private lands. It is unknown if the species was more widely distributed in the Black Hills than reflected by the currently known occurrences, or whether the currently known sites are remnants of the historically distributed range of occurrences. However, a variety of activities, both on lands administered by the Forest and those on private lands, particularly mining, have likely altered the hydrological characteristics of streams in the northern Black Hills along with thedistribution of *C. alopecoidea* along those systems as compared to presettlement conditions. Historic and ongoing livestock grazing and trampling may cause drying of associated riparian habitat conditions (USDA Forest Service 1996), and reduction in beaver and disturbance created associated riparian conditions has likely negatively affected this species as compared to the historic conditions. It is therefore likely that the species has been impacted and numbers potentially reduced compared to pre-settlement conditions.

There is a high rate of development occurring on private lands in the northern Black Hills as evidenced by new construction, and it is unknown what if any activities, hydrologic alterations, weeds or weed treatments may be occurring on those properties or what impacts, if any, may be occurring at any private land *Carex alopecoidea* sites. However, if impacts are occurring, they could be abundant based on the considerable amount of private land located in the northwestern Black Hills immediately adjacent to where Forest administered occurrences of *C. alopecoidea* are located. There is less adjacent private land located near *C. alopecoidea* occurrences in the Bearlodge Mountains. No other state or federal agencies manage lands immediately adjacent to known *C. alopecoidea* occurrences.

If implemented, Alternatives 1 and 2 do not provide as specific of conservation or protection in the foreseeable future for associated habitat conditions for sensitive plant species as do the Phase II Amendment action alternatives (Alternatives 3, 4 and 6). When all five alternatives are considered, the most conservation and protection for *Carex alopecoidea* would be expected if all objectives, standards and guidelines included in Alternatives 3 and 6 were fully implemented. Alternatives 3 and 6 include conservation measures specified under Alternative 4, as well as additional specific conservation measures and actions to be implemented to target the goal providing for the species long term persistence on the Black Hills National Forest. Riparian shrubland restoration, an activity that is expected to conserve or enhance hydrological function and saturated soil conditions is expected to provide or conserve conditions suitable for *C. alopecoidea* occurrence retention or expansion, provided that restoration activities would occur within areas suitable for *C. alopecoidea*. Protection of streams, saturated riparian conditions and hydrologic function (Objectives 2505, 2505d, and 2507; Standards 3106, 9107 and 9108) is expected to provide conservation or expansion of *C. alopecoidea* habitat. Alternative 3 takes a stronger stance at maintaining or creating low crown-fire hazard adjacent to emphasis plant species (Objective 200-05) as compared to Alternative 6 and would be expected to have a lower risk of loss of occurrences than Alternative 6 which takes less aggressive conservation action by only creating or maintaining a moderate to low risk of crown fire near occurrences. Alternative 6 also gives priority of fuels reduction activities to ARC and WUI areas, whereas Alternative 3 focuses priority of fuel reduction treatment at emphasis species locations to reduce the likelihood of species occurrence losses from high intensity fire. Given the historical and current land use activities, and the current persistence of *C. alopecoidea* under these current conditions, it is expected that full implementation of any of the alternatives would provide conditions for the long term persistence of *C. alopecoidea* on the Black Hills National Forest, with full

implementation of Alternative 3 providing the least risk to the species long term persistence followed by Alternative 6.

Although no impacts to the species has been noted recently from off road vehicle use (primarily ATV traffic), it can be expected that since many of the occurrences are located near road access areas it is likely that *Carex alopecoidea* individuals will be impacted by this increasing activity. Some areas of the Forest are receiving greater disturbance levels associated with increasing off road activities. High levels of off road activities have been noted in the northwestern Black Hills in the general vicinity of where some *C. alopecoidea* occurrences are located. Off road disturbances are also occurring in riparian and wetland areas in the Black Hills where they can be easily accessed. Therefore, it may be expected that any future increases in off road vehicle activities in the Black Hills could also lead to direct adverse impacts of *C. alopecoidea* individuals wherever off road vehicle use may occur within a portion of any of the occurrences. The Forest is currently working on a travel management plan that is expected to address issues and effects associated with off road vehicle use.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Carex alopecoidea*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6. Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *C. alopecoidea* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.3.3 Determination and Rationale

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing (USDA Forest Service 2005c) is made for *Carex alopecoidea* (foxtail sedge) for all Phase II alternatives**.** Specifically, the above determination for *C. alopecoidea* (foxtail sedge) is based upon the following assumptions:

1. The determination is made for the remaining life of the 1997 Plan with associated amendments and determinations will be re-evaluated during any revisions to the Forest Plan (currently expected targeted revision Decision date is 2012).

2. That all conservation objectives and protective standard and guideline direction listed above for the various alternatives will be fully applied or implemented as written.

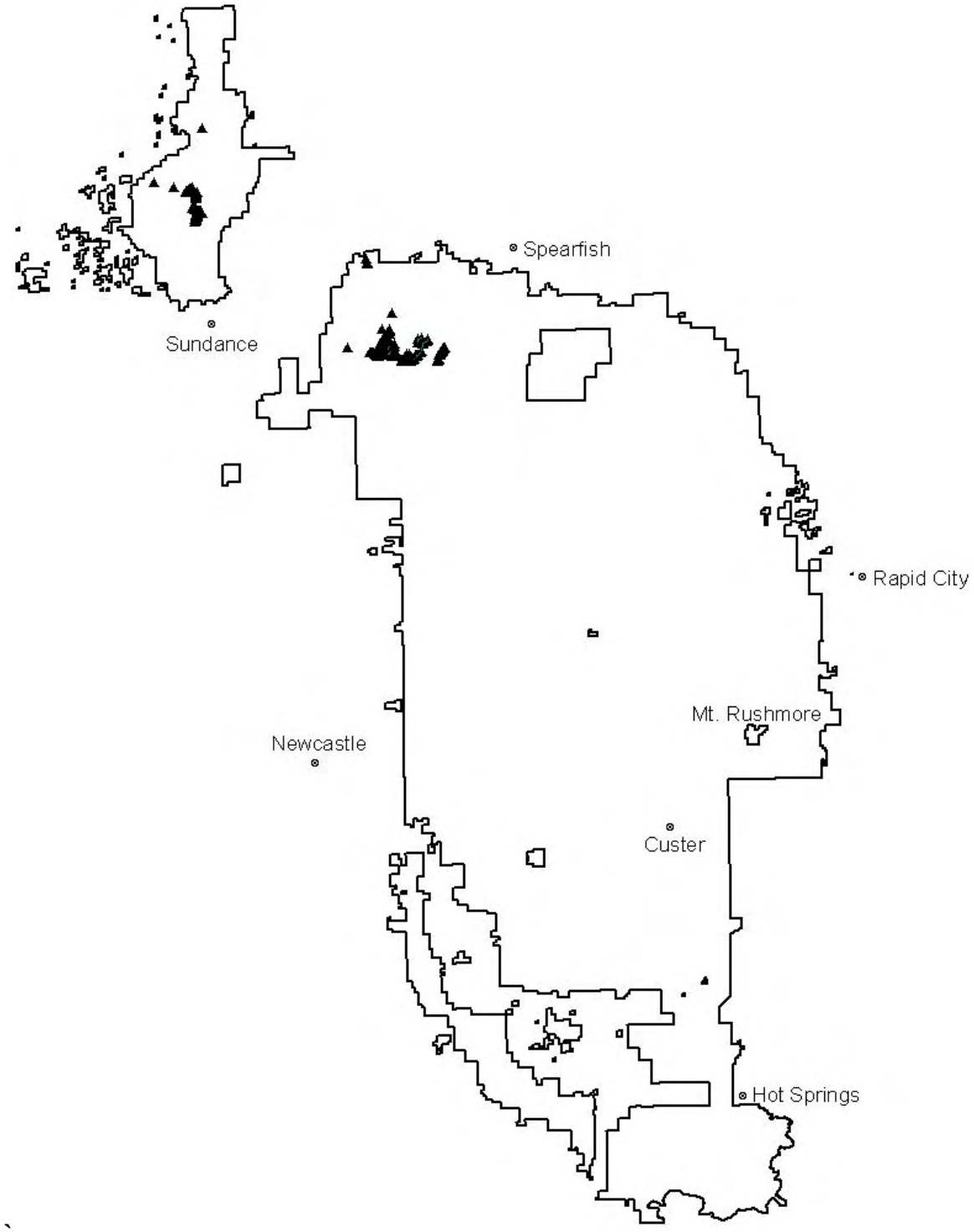
3. Regardless of which alternative is a selected, any sites supporting Region 2 Sensitive species such as *Carex alopecoidea* occurrences are the first priority for treating noxious weeds.

4. That under any of the selected alternatives the species will be monitored according to the current monitoring design (or as altered through reassessment with the Rocky Mountain Research Station) for *Carex alopecoidea* (USDA Forest Service 2005b).

5. That plant material collected on the Forest can be used to successfully recolonize all (or portions of) core *Carex alopecoidea* occurrences in the event such sites are lost.

6. That in spite of the conservation practices the Forest may use, this plant occurs in areas that have been periodically intensively impacted over many years by activities the Forest cannot control, such as through road and highway construction or maintenance, mining and the use of exotic invasive plants in roadside seeding. The current monitoring strategy is designed to detect and respond in a timely manner to impacts to the species and its habitat, but not all impacts can be prevented.

Distribution *Carex alopecoidea* (Foxtail Sedge) on lands administered by the Black Hills National Forest



4-1.4. *Lycopodium complanatum* (Groundcedar)

The Revised Forest Land and Resource Management Plan (LRMP) Biological Evaluation (BE) (USDA Forest Service 1996a Appendix H) and the LRMP Phase I Amendment BE (USDA Forest Service 2001c) give an overview of *Lycopodium complanatum* distribution and natural history, and this information is incorporated by reference. Based on the location of additional recently discovered occurrences, and baseline data collection and monitoring efforts that have occurred since 2000, more is known about the species occurrences and distribution in the Black Hills. Information that was available at the time of preparation was incorporated into an assessment (Hornbeck et al. 2003e) and serves as a primary reference source for the following analysis.

Lycopodium complanatum is circumboreal and common across northern latitudes but disjunct or sparse at the southern limits of the species' distribution, such as in the Black Hills. In the Black Hills, *L. complanatum* is disjunct from the nearest occurrences in the Rocky Mountains and is restricted to remnant, boreal white spruce habitats on steep, north-facing slopes and streamside benches (Hornbeck et al. 2003e).

Prior to the 2004 monitoring and survey season, there were four known occurrences of *Lycopodium complanatum* on Forest Service administered lands in the Black Hills: immediately adjacent to the Upper Sand Creek BA (MA 3.1) boundary in Wyoming; near Custer Crossing, South Dakota; near Bear Butte Creek in South Dakota; and within the Grizzly Creek Fire boundary (USDA Forest Service 2004c) near Deadwood, South Dakota. Three previously unknown northern Black Hills occurrences, located approximately 10-11 miles south of Lead, South Dakota, were discovered in 2004: two occurrences in the vicinity of Tilson Creek and an occurrence near Buskala Creek (USDA Forest Service 2005a)

Lycopodium complanatum occurs within the following Forest MAs:

> MA 4.1 – Limited Motorized Use and Forest Product Emphasis – Approximately 29 percent (two occurrences) of the reports are from within this MA.
>
> MA 5.1 – Resource Production Emphasis – Approximately 57 percent (four occurrences) of the reports are from within this MA.
>
> MA 5.4 – Big Game Winter Emphasis – Approximately 14 percent (one occurrence) of the reports is from within this MA (and is located from within the Grizzly Creek Fire boundary).

The global conservation rank of *Lycopodium complanatum* is secure (G5). *L. complanatum* is widespread throughout the boreal regions of North America from Maine to Alaska; but is currently assigned a rank of critically imperiled due to extreme rarity (S1) at the southern warmer and drier limits of its range in South Dakota and Wyoming (NatureServe 2005a).

Lycopodium complanatum is restricted to moist microhabitats (not saturated conditions) within boreal plant communities in ravines, steep drainages, and on moist (not saturated) streamside benches from 5,000 to 6,340 feet elevation (USDA Forest Service 2005d, Hornbeck et al.

2003e). In the Black Hills, it is documented to be associated with a canopy of white spruce, paper birch and ponderosa pine, with an understory of hazel, bunchberry, grouseberry, birch-leaved spirea, and a dense moss cover. These remnant boreal spruce/hardwood forest habitats are fairly abundant in the northern Black Hills, but surveys completed to date reveal that *L. complanatum* occupies only a few small, isolated microhabitats within them (USDA Forest Service 2005b, Hornbeck et al. 2003e). Moderate soil disturbances may create favorable microhabitats for *Lycopodium* spore germination and clonal expansion. However, there is no evidence of recent or historic soil disturbance at any of the known occurrences of either species in Black Hills National Forest (USDA Forest Service 2005b, Hornbeck et al. 2003e).

The odds of finding additional occurrences in the Black Hills is considered to be relatively low because of the rarity of specific microhabitats required within the remnant boreal spruce/hardwood forest habitats and because of the large amount of potential associated habitat conditions that has been surveyed on Forest land. It may be that cold, moist microclimatic conditions, canopy associations, fungal associations, or a combination of these factors define extant habitats. In addition, these factors may be limited to certain vegetative seral stages in successional development (Hornbeck et al. 2003e). This species continues to be targeted for plant surveys on the Black Hills National Forest, and has been a target for surveys since 1993.

4-1.4.1 Direct and Indirect Effects

The persistence of *Lycopodium complanatum* in the Black Hills is considered to be at risk due to both the small number and size of the occurrences, which makes it vulnerable to random stochastic events and invasion by noxious weeds and other invasive plants. At the sites known prior to 2004, livestock use, timber harvest and road building are precluded, or the occurrences are in topographic positions that provide natural barriers to these activities (Hornbeck et al. 2003e). Baseline monitoring data gathered for the three sites discovered in 2004 reflect that conditions are similar to the previously known occurrences that were addressed in the assessment. Livestock use is generally precluded by topographic positions (fairly steep slopes above drainages) and by downed woody material conditions associated with the moist boreal spruce/hardwood vegetation types where occurrences have been documented. No timber harvesting activities or roads were noted within the occurrence locations (USDA Forest Service 2005d).

As identified in the assessment (Hornbeck et al. 2003e), the greatest risk to *Lycopodium complanatum* in the Black Hills is considered to be the small number and limited size of occurrences on Forest Service administered lands. There are no apparent ongoing risks to this species, but all known locations are small enough that random events, such as drought or fire, could eradicate an occurrence entirely. As a boreal remnant, climatic changes since the last glacial period may be the primary controlling factor for the frequency and persistence of this species and its habitat. It should be considered that remnant occurrences of northern boreal species simply may not be able to persist, or the species may not be able to colonize other sites under current or future climatic conditions in the Black Hills (Hornbeck et al. 2003e).

Possible direct effects from Forest activities to *Lycopodium complanatum* could result from fire line creation that may cross one of the occurrences, fuel reduction activities within the WUI (see Phase II FEIS glossary) since some occurrences are close to private land, vegetation treatment to

remove encroaching conifers to conserve and target regeneration of conifer-hardwood habitats, and herbicide treatments. *L. complanatum*'s presence on steep slopes and in areas with down woody debris conditions associated with spruce/hardwood vegetation types generally precludes direct effects of disturbance from many Forest activities, such as livestock and recreational use. Potential indirect effects to individuals or entire occurrences can include alteration or degradation of associated habitat conditions by invasion of noxious weeds and other invasive plant species, resulting open conditions created by high intensity fires that can provide easier access to locations, fire suppression and the resulting increased density of conifers and decrease in light reaching the forest floor.

Lycopodium complanatum occurrences in the Black Hills National Forest are generally unlikely to be impacted by timber harvesting or other management activities. Timber harvest is unlikely to directly impact *L. complanatum* habitat for two primary reasons. First, spruce habitats in the Black Hills are rarely selected for timber harvest because of the low commercial value of this species (Hornbeck et al. 2003f). Second, most of the sites where *L. complanatum* could potentially be expected to occur would generally be difficult to harvest due to their steep slopes or narrow canyons. However, if timber was harvested from *L. complanatum* sites or immediately adjacent to these sites, the construction of roads, skid trail, or log decks could have the potential to directly or indirectly adversely effect *L. complanatum* and its habitat. However, project level National Environmental Policy Act (NEPA) of 1969 analysis for proposed management activities on Forest administered land, includes an assessment of known locations of designated sensitive species and projects have been and are expected to be designed to conserve occurrences of *L. complanatum*. Known occurrences are avoided to the extent possible unless activities are designed to enhance conditions at known occurrences (Hornbeck et al. 2003e). Therefore, direct and indirect effects from timber harvest and associated activities are generally unlikely.

No evidence of livestock use has been noted to date at any of the previously known *Lycopodium complanatum* occurrences. Sites are either too steep (>30 percent slope) for livestock to access, or are restrictive to livestock access by dense shrub thickets or large down woody conditions associated with the vegetative types that they occur in. Some occasional cattle manure droppings were observed on a slope in the general vicinity of one of the 2004 discovered locations, but it was also documented that down woody material was restricting cattle access and no grazing was observed at the specific occurrence location. For this reason, cattle do not currently pose any risk to any of the known occurrences. However, the complete absence of plants or rhizomes from the small wildlife trail that passes through the Custer Crossing *L. complanatum* occurrence may be evidence that the species may not tolerate trampling (Hornbeck et al. 2003e, USDA Forest Service 2004a).

No noxious weeds were documented to occur at any of the *Lycopodium complanatum* occurrences in 2004 (USDA Forest Service 2005a), therefore, invasive plants are not currently an immediate risk to *L. complanatum*. However, it is recognized that there is potential for invasion because of their close proximity to some of the currently known occurrences (USDA Forest Service 2005a). Because *L. complanatum* becomes established in areas of disturbed soil conditions, competition from colonizing weeds could inhibit establishment (Hornbeck et al. 2003e). All alternatives propose various levels of protection for Region 2 Sensitive plant species from noxious weed invasion and treatment. Objective 231 is included in all alternatives for the prevention and reduction of noxious weed invasion into native plant communities. In

Alternatives 1 and 2 the objective is to treat 3,600 acres per year. Targeted treatment acres are increased to 6,000 acres per year in Alternatives 3 and 4, and further increased in Alternative 6 (the preferred alternative) to a minimum of 8,000 acres per year. Guideline 4303 revised the priority order for treatment of weeds, and first priority for treatment in action alternatives is to occur at Region 2 Sensitive and Species of Local Concern plants and snails. Guideline 4304 (Alternatives 1 and 2) was revised and elevated to a standard in Alternatives 3, 4, and 6, to require treatment methods that pose the least risk to the species being protected. The no action alternatives (Alternative 1 and 2) do not include monitoring weed control effectiveness at Region 2 sensitive species sites to determine if weeds at those sites need to be retreated throughout the season to reduce the risk to species long term persistence associated with noxious weed competition. Standard 4300-1 specifies this type of monitoring and was included in Action Alternatives 3, 4, and 6 to further address the recognized risk that noxious weeds present to Region 2 Sensitive plant species such as *L. complanatum*. Phase II No Action Alternatives 1 and 2 require the use of certified noxious weed-free seed, feed and mulch on the Forest (Standard 4306). This standard was revised in action alternatives (Alternative 3, 4 and 6) to require that the seed be tested at time of purchase to confirm that the seed is weed-free to take further preventative action against weed invasion. Mitigation of noxious weed invasion into native plant communities by revegetating with native species is included under Guideline 1110 in Alternatives 1 and 2. The original guideline was revised and was strengthened to a Standard 1110 in Alternatives 3, 4, and 6. Standard 4301 provides for assessing the risk of noxious weed introduction or spread for proposed projects and requires appropriate mitigations for all alternatives. Alternatives 3 and 6 include language in this standard to implement appropriate treatments for noxious weeds. Since noxious weed occurrences and various other invasive species are becoming more prevalent on the Forest (USDA-Forest Service 2003b) and other land ownership, as well as being a potential risk to *L. complanatum* (Hornbeck et al 2003e), Alternatives 3, 4, and 6 are expected to have the lowest risk of indirect and direct adverse effects to *L. complanatum* from noxious weeds and their treatment (see Section 3-7.3 Noxious Weeds).

Lycopodium complanatum occurrences are characterized as spruce forest intermingled with birch and shrubs; suggesting they are transitional between birch and spruce habitat types (Hornbeck et al. 2003e). Vegetation data documented at the sites discovered in 2004 are consistent with this statement from the assessment (USDA Forest Service 2005d). Management for mature spruce habitats in the Black Hills would likely be expected to conserve existing associated *L. complanatum* habitat conditions in the short term, but in the long term may reduce boreal hardwood forest components that *L. complanatum* may likely need for any potential colonization and establishment of new occurrences to contribute towards the species long term persistence within the Black Hills. Objective 204 (Alternatives 1, 2, and 4) benefits emphasis species associated with white spruce by conserving and managing white spruce. Alternatives 3 and 6, however, conserve and manage birch/hazelnut, as well. The birch/hazelnut community type is emphasized because it is less abundant, is often encroached upon by spruce, and provides habitat conditions associated with several emphasis species. Objective 200-1 (Alternatives 3 and 6) manages for mature and late successional spruce acres (except within 300 feet of buildings in Alternative 3 and 200 feet in Alternative 6, where spruce has encroached into hardwoods or where implementing emphasis species management). Alternative 3 adds an additional exception in areas where beaver reoccupation is desired for conservation of other emphasis species. In Alternative 3, hardwood restoration is favored where spruce has encroached upon hardwoods and spruce is favored where it is encroaching into pine stands. Implementation of Alternative 6

manages for 20,000 acres of spruce, which could be at the expense of hardwood maintenance or restoration. In summary, regarding Objective 204 and Objective 200-1, Alternatives 1, 2, and 4 target retention of existing spruce at the expense of losing other types of communities, Alternative 3 can be interpreted to basically place similar emphasis on hardwoods in relation to spruce, whereas interpretation of Objective 200-01 places more emphasis on managing for spruce rather than hardwoods (by managing for 20,000 acres of spruce), although emphasis is also to be placed on hardwoods and emphasis species. Under Alternatives 1, 2, and 4, it is expected that existing *L. complanatum* habitat would likely be conserved in the short term, but in the long-term it is expected that boreal hardwood forests for future colonization could be lost. Under Alternative 6, it is expected that even though some future colonization habitat could be expected for *L. complanatum*, that managing for spruce would take precedent. It is expected that full implementation of Alternative 3 would be expected to better provide for conservation of existing *L. complanatum* occurrences as well as targeting a mix habitat conditions for potential future colonization areas.

Although dense spruce cover may enhance shade and longer snow and moisture retention at the currently known occurrences, the continuity of highly flammable, dense conifer stands (pine and spruce) adjacent to *Lycopodium complanatum* sites is of concern. Large tracts of dense conifers may lead to widespread, high intensity wildfires that could negatively affect *L. complanatum* sites. Prescribed fire or fuel reduction activities are subject to environmental (NEPA) analysis at the project level. Wildfire and fire containment measures are a potential risk to *L. complanatum* (Hornbeck et al. 2003e). Where currently known occurrences are bordered by continuous, dense conifer stands, cutting firebreaks and implementing other fuel reduction activities that would result in crown fires dropping to the ground before fires burn into known sites would be expected to benefit the species by reducing the likelihood that catastrophic events would extirpate those occurrences. This fuel reduction approach could also provide a range of seral stages for later colonization, which might benefit the species' persistence in the long term. Tree removal in surrounding uplands could have the added benefit of providing increased moisture to the sites (Hornbeck et al. 2003e). Objective 200-5 was included in Alternative 3 to create or maintain a low crown fire hazard adjacent to occurrences of Region 2 Sensitive and Species of Local Concern plants and Botanical Areas bordered by continuous, dense conifer stands where long-term persistence is at risk from a single high intensity fire. Implementation of this objective near *L. complanatum* occurrences is expected to decrease fire effects and benefit occurrences during fire events. Based on other priority emphasis, Alternative 6 is less aggressive in terms of this conservation measure by only targeting creation or maintainenance of a moderate to low crown fire hazard adjacent to these species occurrences so the risk of crown fire that could reach occurrences would be expected to be greater. Alternatives 1, 2, and 4 do not include an objective to reduce fire hazard around occurrence locations and the risk of occurrence loss is highest in these alternatives. Therefore it is expected that full implementation of Alternative 3 would be expected to reduce fire risk in proximity to occurrences to the greatest extent of any of the Phase II Alternatives.

Since two of the *Lycopodium complanatum* occurrences are located within the 1.5 mile Wildland Urban Interface(WUI) circumference area of the Galena At-risk Community (ARC), it is assumed that Objective 200-5 (to reduce fuel hazard near Region 2 Sensitive Species) could be achieved near those sites in conjunction with fuel reduction efforts near ARC (refer to Appendix G, Map G-6: At-risk Communities and Wildland Urban Interface) that has been included in

Alternative 6. However, another assumption is that various areas can be expected to receive treatment under all alternatives because of the tie to the legislation (refer to Appendix B of the FEIS for discussion of At-risk Communities and the Wildland-Urban Interface for more information). There is a great deal of uncertainty on any effects statements regarding treatments around ARC and *L. complanatum* because without a priority system or a map indicating which ARC are targeted first or to what level fuel treatments would occur, it is not known if any treatments would even occur within the immediate vicinity of the species occurrences.

Objective 200-4 was designed into Alternatives 3, 4, and 6 for conservation of species expected to be at risk from catastrophic events, whether natural or human induced. This objective provides for the collection of emphasis plant species material from the Black Hills for reintroduction efforts if needed. If successful it is expected that this conservation measure would provide material to target the future long term persistence of the species on the Black Hills under these alternatives. No direction for collection of such material as a conservation measure is included in the No Action Alternatives (Alternatives 1 and 2) so any recolonization of a site would rely on what is available for natural recolonization.

Basic monitoring direction for Region 2 Sensitive Species is provided in FSM 2670 and Chapter 4 of the LRMP (1997) and by the Phase I Amendment to the 1997 LRMP. However, the direction does not specify the type and level of information that is needed in the monitoring. All sites, including the most recently (2004) discovered sites have baseline data (USDA Forest Service 2005a). Monitoring design was revised for the 2005 monitoring season to reflect the discoveries of occurrences in 2004 and to reflect new information from previously monitored sites. The design of the monitoring was also revised to keep disturbance associated with monitoring activities to a minimum since disturbance associated with monitoring these remote and limited access occurrences is more disturbance than most of these sites have received from any other Forest activities in the past and therefore monitoring disturbance activities was recognized as potentially presenting more effects to occurrences and therefore a higher risk to this species long term persistence on lands administered by the Forest. Therefore, a subset of the total Forest occurrences has been selected as core monitoring sites and the monitoring design continues to include gathering information to assess changes in the extent and condition of the species. Overall Forest monitoring direction has been revised during this amendment process and is included in Chapter 4 of the LRMP, as amended by the Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction). Information on the current monitoring strategy for *L. complanatum* is available in the Forest Plan Monitoring Implementation Guide (USDA Forest Service 2005b).

Several species of *Lycopodiums* are widely collected as non-timber, special forest products for use in seasonal decorations and floral displays. There is no indication that clubmosses have ever been collected from the Black Hills National Forest (Hornbeck et al. 2003e). The remote locations and difficult access to known *Lycopodium complanatum* occurrences makes collection unlikely. Standard 3119 is included in Alternatives 3 and 6 to reduce the effects associated with collection activities by restricting the collection of sensitive plants (or parts thereof) to only those needed for scientific or educational purposes, or as recognized for American Indian traditions (Standard 7103) that allows for collection of Region 2 Sensitive species through consultation. This would prohibit collecting for both personal (other than for American Indian traditional uses) and commercial uses, thereby limiting the associated direct effects of plants removed from

occurrences. It is unknown if this species is traditionally collected in the Black Hills however, no collection activities have been observed at the monitoring locations (USDA Forest Service 2005d). However, indications at meetings are that local American Indian interests are in maintaining plant species persistence for those species that have traditional uses. Although uncertain, the assumption is that traditional uses and scientific collections may be expected to directly affect a limited number of individual plants. Another assumption is that it would likely not be expected that if a very limited number of plants were collected that traditional collection would present a significant risk to the overall long-term persistence of this species on the Black Hills National Forest. Alternatives 1, 2 and 4 do not have Standard 3119, however, those alternatives do have a version of Standard 7103; however, the version in those alternatives does not specify consulting on Region 2 Sensitive Species collection.

Occurrences are located within MAs 4.1, 5.1 and 5.4. Most changes for the conservation of species long term persistence is provided in the overall Forestwide direction rather than in specific management area direction such as for those where the occurrences are located. Most changes in management area direction for MAs 4.1, 5.1 and 5.4 affect ponderosa pine structural stage direction. The assumption is that these would be designed to occur across planning unit areas, such as watersheds, and would not be expected to conflict with targeting reduction of fire risk near *Lycopodium complanatum* occurrences Therefore these structural stage change objectives associated with ponderosa pine stands (a different ecological type than what the species is associated with) would generally be expected to have little change in beneficial or negative effects to *L. complanatum* as compared to existing Forest Plan direction.

None of the *Lycopodium complanatum* occurrences are located within any of the candidate RNAs, therefore no beneficial or negative effects are expected to be associated with any that may be proposed for designation in the Phase II Amendment Decision.

4-1.4.2 Cumulative Effects

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

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives for this plant species is smaller then generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey 1995). The spatial area used for the cumulative effects analysis for *Lycopodium complanatum* primarily includes a portion of the very northern to northwestern Black Hills within the upper elevations of the Sand Creek watershed, the upper elevations of the Boxelder Creek watershed to the west of Custer Crossing, the upper elevations of the Strawberry Creek and Butcher Gulch watersheds near Galena, SD and the Tilson Creek watershed located approximately 10 miles south of Lead, SD. This area was chosen because it generally encompasses the area covered by known occurrences. A larger area would include other geologic elevation and non-boreal ecosystem components which generally include a different suite of species than those that occur within the occurrence locations for this species.

Historic land use in the Black Hills, particularly fire suppression, has likely altered the distribution of boreal habitats and led to an increase in spruce (Hornbeck et al. 2003e). Therefore, the amount of potential habitat for *Lycopodium complanatum* may have increased; however, it is not known if microhabitat conditions needed by *L. complanatum* are present in any of the spruce expansion locations.

Occurrences on private land could be subject to impacts associated with various intensive site altering activities associated with urban development or mining. The current status of other *Lycopodium complanatum* occurrences on private land is unknown, and the likelihood of finding additional species is generally considered to be low; therefore the persistence of this species in the Black Hills is expected to be contingent on conserving the known occurrences on public land (Hornbeck et al. 2003e, USDA Forest Service 2004a, USDA Forest Service 2005a).

Monitoring has not revealed any impacts to occurrence persistence from wildlife browsing, disease, or insects. A wildlife trail has been noted through one of the occurrences. Insect predation is uncommon on clubmosses (Lycopodiaceae) and fern allies in general (Hornbeck et al. 2003e, USDA Forest Service 2004a, USDA Forest Service 2005a).

The Lead, Deadwood, and Galena areas in the northern Black Hills have been at the center of both recent and historic gold mining activity (Hornbeck et al. 2003e). There is evidence of past mining disturbance (old test pits on slopes) in the northern Black Hills. The current trend for mining permit requests are for placer mining, which occur in drainage bottoms, and it is generally anticipated that there would not be any direct impacts to *Lycopodium complanatum* occurrences since they occur on slopes. There is no evidence of current mining practices posing risks to *L. complanatum* occurrences (USDA Forest Service 2004a, USDA Forest Service 2005a) although there may be an unknown potential for sites to be encompassed by future mining claims. Although unknown, it is possible that there may be surface mining activities that could occur in or near known sites that could impact the species and their habitats, and future mining activity is likely to occur in the area (Hornbeck et al. 2003e).

Activities and effects on *Lycopodium complanatum* were discussed in the section based on the current locations of designated ARC (refer to Map G-6 in Appendix G: At-Risk Communities and Wildland-Urban Interface). This map is subject to change with the potential that more areas could likely be designated as ARC (refer to Appendix B of the FEIS for discussion of ARC and the WUI for more information), with fuel reduction actions to occur within an estimated 1.5-mile WUI circumference area around those designated areas. It is uncertain how this expected revision of the list will result in changes in placement or levels of treatments around species occurrences and how effects would be expected to change.

Although no impacts to the *Lycopodium complanatum* occurrences have been noted recently from off road vehicle use (primarily ATV traffic), depending on how aggressive the use becomes in the future, there is a possibility that individuals could be impacted. High levels of off road activities have been noted in the northwestern Black Hills in the general geographic vicinity of where *L. complanatum* occurrences are located, however, due to the steep slopes and dense vegetation conditions associated with the species, that even with this increasing off road vehicle use the risks to the species long term persistence on the Forest is generally considered to be low.

The Forest is currently working on a travel management plan that is expected to address issues and effects associated with off road vehicle use.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Lycopodium complanatum*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6. Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *L. complanatum* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.4.3 Determination and Rationale

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing (USDA Forest Service 2005c) is made for *Lycopodium complanatum* for all Phase II alternatives**.** The rationale for this determination is that several standards and guidelines under each alternative address the various potential risks to this species as described earlier. Other conservation strategies and measures that vary by alternative provide for conservation or enhancement of *L. complanatum* habitat conditions, and *ex situ* collections of plant material are expected to be available for re-introduction if needed. Specifically, the above determination for *L. complanatum* is based upon the following assumptions:

1. The determination is made for the remaining life of the 1997 Plan with associated amendments and determinations to be re-evaluated during any future amendments or revisions to the Forest Plan (currently expected targeted revision Decision date is 2012).

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

3. That regardless of which alternative is selected, the species will be monitored according to the current monitoring protocol (or as altered through reassessment with the Rocky Mountain Research Station), which is designed to detect and respond in a timely manner to changes in the extent and condition of *Lycopodium complanatum* occurrences (USDA Forest Service 2005b).

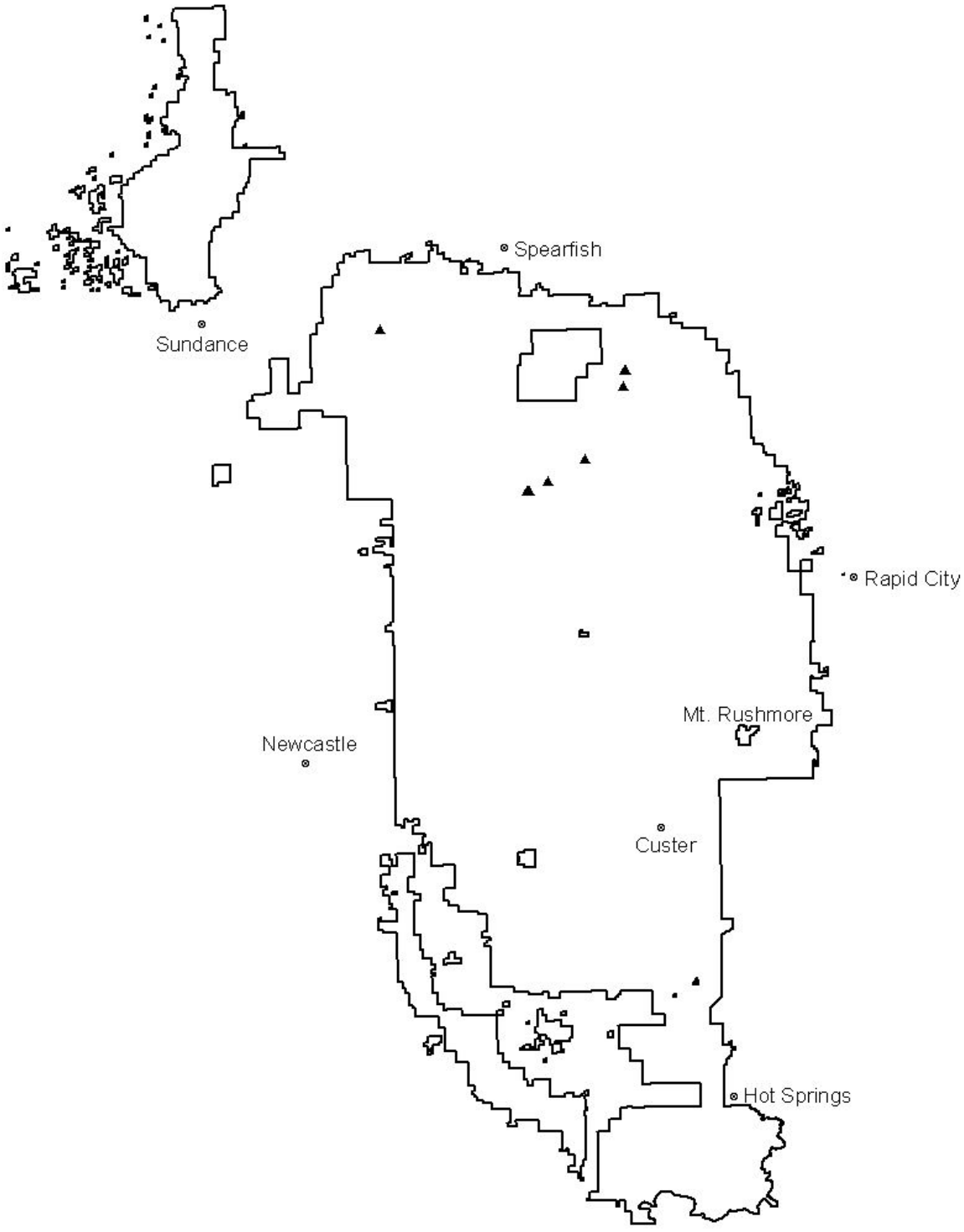
4. Regardless of which alternative is a selected, any sites supporting Region 2 Sensitive species such as *Lycopodium complanatum* occurrences are the first priority for treating noxious weeds.

5. That plant material collected on the Forest can be used to successfully re-colonize all (or portions of) occurrences in the event such sites are lost and determined that they would not be able to re-colonize naturally.

6. That in spite of the conservation practices the Forest may use, this plant occurs in areas that have been periodically intensively impacted over many years by activities the Forest cannot control, such as highway construction or maintenance and the use of exotic

invasive plants in roadside seeding. The monitoring strategy is designed to detect and respond in a timely manner to impacts to the species and its habitat that may occur on lands administered by the Forest, but not all impacts can be prevented.

Distribution of *Lycopodium complanatum* (Groundcedar) on lands administered by the Black Hills National Forest



4-1.5. *Viburnum opulus* var. *americanum* (Highbush Cranberry)

This species was originally included on the revised Region 2 Sensitive species list effective December 2003 (USDA Forest Service 2003) and remained on the updated Region 2 Sensitive Species list, effective May 17, 2005 (USDA Forest Service 2005c); therefore, information is not currently available in Black Hills National Forest programmatic level documents to which to tier to for additional information.

Viburnum opulus var. *americanum* (highbush cranberry) is a widespread species with disjunct occurrences in the Black Hills in South Dakota and Wyoming (NatureServe 2004d). It is widely distributed across north central North America: in Canada from Newfoundland to south British Columbia; and in the United States from Maine to Washington, extending southward to Kentucky, Missouri and Nebraska (NatureServe 2005a).

Viburnum opulus var. *americanum* is primarily located in the northern Black Hills and Bearlodge Mountains and is reported from greater than 30 occurrences on Forest lands (there are close to 70 reported *V. opulus* var. *americanum* locations on the Forest, including recently discovered 2004 locations, ranging from a few individuals to greater than 120 individuals, but as baseline monitoring data is currently being collected on this new 2003 Region 2 Sensitive species, a number of separately reported sites are being are being documented as occurrence extensions along drainages and are combined into larger occurrences). Approximately 80 percent of the currently known occurrences were reported during recent surveys conducted in 2002 and 2003 (USDA Forest Service 2005a) and additional occurrences were located in 2004 (USDA Forest Service 2005a). Occurrences are widely dispersed across the Forest and are located in Crook, Lawrence, Meade and Pennington Counties. Currently known occurrences are distributed over a wide elevational range from 3800 to 5700 feet and within10 sixth level watersheds on Forest lands (USDA Forest Service, 2005a, USDA Forest Service 2005d). A few sites have been reported from private lands within the Forest Boundary. This shrub species often occurs with a number of other shrub species in dense thickets (USDA Forest Service 2005a, USDA Forest Service 2005d). Unless the species is specifically targeted for survey there are situations where it is likely not to be noticed within higher density shrub thickets. Many of these thickets are so dense that they are basically impenetrable and it is likely that the numbers of individuals at reported occurrences is a conservative number. At the time the evaluation sheets for the Region 2 sensitive species list were prepared (USDA Forest Service 2002c, USDA Forest Service 2001e), the species was simply under reported in the Black Hills which indicated that at that time the species was considered to be rare. The number of discovered occurrences for 2002-2004 further supports that the species was under reported.

Known locations are geographically dispersed in the Black Hills and *Viburnum opulus* var. *americanum* is widespread from the central to northeastern to northwestern portions of the Black Hills. Therefore, this widespread species is currently known to occur in a variety (eight) of designated Forest Management Areas (MA) and the approximated percentages are based on 67 reports currently entered into Forest Plant Database (USDA Forest Service 2005d):

> MA 3.1 – Botanical Areas (Dugout Gulch, Higgins Gulch, Bear/Beaver Gulches Botanical Areas) – Approximately 23 percent of the total reports are from within this MA.

MA 3.32 – Backcountry Non-motorized Recreation Emphasis – Approximately three percent of the reports are from within this MA.

MA 3.7 – Late-successional Forest Landscapes – Approximately 14 percent of the reports are from within this MA

MA 4.1 – Limited Motorized Use and Forest Product Emphasis – Approximately three percent of the reports are from within this MA.

MA 5.1 – Resource Production Emphasis – Approximately three percent of the reports are from within this MA.

MA 5.2A – Fort Meade VA Hospital Watershed – Approximately five percent of the reports are from within this MA.

MA 5.4 – Big Game Winter Emphasis – Approximately 42 percent of the reports are from within this MA.

MA 5.6 – Forest Products, Recreation and Big Game Emphasis – Approximately eight percent of the reports are from this MA.

The global rank for *Viburnum opulus* var. *americanum* is demonstrably secure is (G5T5). The species is currently assigned a rank of critically imperiled (S1) in Wyoming; however, the currently known number of occurrences on Forest land in Wyoming has increased to greater than 15, and it is expected that the rank will be revised to a higher rank to reflect the recent additional reports for this species. *V. opulus* var. *americanum* is reported but not ranked (SNR) in South Dakota (NatureServe 2005d).

Viburnum opulus var. *americanum* is a deciduous shrub that grows to 13 feet tall, with smooth, light gray to brownish branches. It has numerous white flowers in terminal, flat-topped clusters. The fruits develop from August to September and are bright orange to red in color, 0.3-0.5 inches in diameter and have a flattened pit (Larson and Johnson 1999).

On Forest lands *Viburnum opulus* var. *americanum* is primarily associated with moist but well-drained sites and grows in dense shrub thickets and in deciduous woodlands with tree canopy covers ranging from zero to 90 percent (some areas have a limited number of conifer species). Sometimes the shrubs are found along streams with running water but only seven of the reported occurrences were recently documented to occur in areas with saturated soil conditions. The majority of the reports document the species to be associated with dry to moist soil conditions, often in and adjacent to upper watershed ephemeral draws and on gentle to steep wooded hillslopes, with most of the shrubs occurring on northern aspects. The species most commonly documented to occur with *V. opulus* var. *americanum* on Forest lands include *Betula papyrifera* (paper birch), *Ostrya virginiana* (ironwood), *Corylus cornuta* (hazelnut), *Populus tremuloides* (aspen), *Crataegus chrysocarpa* (hawthorne), *Acer negundo* (boxelder), *Prunus virginiana* (chokecherry) and *Quercus macrocarpa* (bur oak) (Black Hills National Forest Plant Database 2005d).

4-1.5.1 Direct and Indirect Effects

Viburnum opulus var. *americanum* is considered to be relatively secure in the Black Hills at this time based on the large number of occurrences that are widely distributed across the Forest. In addition, greater than 30 percent of the currently reported occurrences are located in MAs with more restrictions of, or minimal levels of activities (see MA 3.1 and 3.7 directions in the 1997 LRMP for the Black Hills National Forest). At the time that Region 2 of the Forest Service had evaluations completed for the species (USDA Forest Service 2002c, USDA Forest Service 2001e) the effects of management activities on *Viburnum opulus* var. *americanum* were from limited documentation associated with reported locations of the shrub and with little information coming from intensively collected baseline data for the species as it occurs within the Black Hills. However, evaluations used what information was available to describe what direct and indirect effects were thought to be likely impacts to habitat. The evaluations indicated that the following could be expected to present impacts or risks to the species or its habitat: road construction, livestock trampling, altered hydrology, and other disturbances of riparian areas (USDA Forest Service 2003c). Baseline monitoring data collected at 17 locations (11 locations in 2003 and 6 locations in 2004) to support the development of quantitative monitoring has provided additional updated information for the assessment of risks and effects to the species and is used in this analysis. Of these, nine of the occurrences were located in South Dakota and eight were in Wyoming. Two of the baseline data collection locations were from designated BAs (USDA Forest Service 2005d).

No specific livestock use disturbances were observed at 14 of the 17 specific occurrence locations (or approximately 82 percent) where baseline data were collected in 2003 and 2004 (this includes two baseline data locations within designated Botanical Areas). Livestock use was observed in the nearby general vicinity of the other three baseline data collection locations, but no use was observed on any of the *Viburnum opulus* var. *americanum* individuals. Documentation revealed that livestock were primarily restricted from accessing individuals of this species by the dense shrub thickets or steep slopes where *V. opulus* var. *americanum* individuals were located. In addition to baseline documentation, reported occurrences were compared to Forest livestock allotment maps. Ten of the *V. opulus* var. *americanum* occurrences are reported to occur within vacant allotments on the Forest. Of the 67 reported locations from the updated 2005 database (Black Hills National Forest Plant Database 2005d), approximately 20 percent document grazing in the general vicinity or cattle were observed in the vicinity of *V. opulus* var. *americanum* reported locations, and include the three areas where baseline monitoring occurred. No cattle use was documented on any of the *V. opulus* var. *americanum* individuals where baseline data was gathered in 2004 (USDA Forest Service 2005d). It is likely that some percentage of the other locations have similar associated steep slope and dense shrub habitat conditions that restrict cattle from accessing all or portions of *V. opulus* var. *americanum* occurrences. Therefore, cattle may trample or graze some of the smaller individuals that are located on some gentler slopes, located in riparian areas along some streams (USDA Forest Service 2001e) or that may have adjacent openings that allow cattle access; however, there are a number of occurrences or portions of occurrences that are reported with steeper slope conditions and higher shrub canopies and these would generally not be expected to receive any direct effects from livestock use. Some roads or vegetation treatments (treatments that open the canopy or remove basal area) that may occur near *V. opulus* var. *americanum* would likely be expected to result in altered livestock distribution patterns; however, project design is to include

consideration of Region 2 sensitive species no matter which Phase II Amendment alternative is selected and should be expected to limit alterations of livestock use that may result in adverse direct effects to *V. opulus* var. *americanum*. If livestock use occurs within designated Botanical Areas, the following are expected to be implemented to reduce or eliminate effects to Region 2 Sensitive plant species that would occur there, such as for *V. opulus* var. *americanum*. Standard 3.1-1001 provides for the protection of botanical values for which the area was designated. This standard was revised for Alternatives 3 and 6 to include protection for additional botanical values that may continue to be discovered (which is assumed to include protection of species on the 2005 Revised Region 2 sensitive species list that may be discovered within Botanical Areas). Standard 3.1-2503 (Alternative 2) was rewritten for Alternatives 3 and 6 for clarification. The standard for Alternatives 3, 4, and 6 directs that authorized livestock are to be restricted from accessing Region 2 sensitive species in designated Botanical Areas. It is assumed that restrictions of livestock will be fully implemented and therefore no direct effects would be associated with livestock use at any *V. opulus* var. *americanum* occurrences within the designated Botanical Areas. None of the Phase II Amendment alternatives vary levels of livestock use from that currently being experienced on the Forest. Based on the revisions listed regarding livestock, it is assumed that if objectives, standards and guidelines are fully implemented in Alternatives 3, 4, and 6 that those alternatives would be considered to generally have the least potential adverse effects to this shrub species from permitted livestock use, followed by Alternative 2 and then Alternative 1 (many guidelines in Alternative 1 for livestock were strengthened to standards in Alternative 2).

Most activities associated with timber harvest activities are generally not considered to be a persistence risk to *Viburnum opulus* var. *americanum* on the Black Hills because current project design generally includes avoidance and mitigation to reduce direct and indirect effects to Region 2 Sensitive plant species, or may potentially be designed to provide beneficial long-term indirect effects for the species (i.e. reduce risk from high intensity disturbance events). In addition, the primary habitat conditions (hardwoods and shrubs) associated with where the majority of *V. opulus* var. *americanum* occurrences are located is generally not in an ecological type where commercial timber harvest is generally targeted (primarily ponderosa pine). In addition, *V. opulus* var. *americanum* occurrences are located in three of the designated Botanical Areas on the Forest. Vegetation treatments (logging or wood gathering activities) for Project Decisions tiered to the 1997 Decision and as revised by the Phase I Amendment Decision (2001) are generally only to be allowed to occur in Botanical Areas if necessary to maintain, restore or enhance values for which the Botanical Area was designated (Standard 3.1-2101). Standard 3.1-1001 was originally included in Alternative 1 (and retained in Alternatives 2 and 4) to provide for the protection of botanical values for which the area was designated. This standard was revised for Phase II Amendment Alternatives 3 and 6 to include protection for additional botanical values that may continue to be discovered (which would be expected to include protection of species on the 2005 Revised Region 2 sensitive species list such as *V. opulus* var. *americanum*).

Habitat conservation or enhancement measures that could conserve existing levels or increase soil moisture at the *Viburnum opulus* var. *americanum* occurrences that are actually associated with saturated conditions include management activities that restore conditions favorable to the long-term goal of successfully re-introducing beaver near occurrences. All alternatives seek to maintain or restore historic wet areas, wet meadows, and beaver (Objective 215). Any successful

restoration of hardwoods (aspen) and re-introduction of beaver (Objective 215) along and just upslope or upstream of *V. opulus* var. *americanum* riparian condition associated occurrences could be expected to conserve or improve saturated soil conditions that may contribute to the likely long-term persistence of *V. opulus* var. *americanum* on Forest lands. In addition, Objective 214 targets restoration of 500 acres of riparian shrub communities under Alternatives 1, 2, 4 and 6 and 1,000 acres under Alternative 3. Alternative 6 prioritizes riparian restoration efforts in areas surrounding Federal Register designated ARC (see Appendix G to the EIS, map G), which could benefit *V. opulus* var. *americanum* sites that occur within ARC treatment locations (refer to Appendix B of the FEIS for At-risk-Communities and the Wildland-Urban Interface discussions). Objective 215 targets the rehabilitation of riparian habitats along three stream reaches under Alternatives 1, 2, and 4, and five stream reaches under Alternatives 3 and 6. If these activities under any of the alternatives were prioritized immediately adjacent to *V. opulus* var. *americanum* occurrences then it is likely that successful restoration and rehabilitation efforts could be expected to benefit the species long term persistence on Forest land.

Objective 200-5 was included in Alternatives 3 and 6 to target conservation of occurrences that could be at risk to catastrophic wildfires by the creation or maintenance of conditions in the adjacent upland conifer stands that would increase the likelihood of dropping crown fires to the ground before reaching Region 2 Sensitive plant species, such as *Viburnum opulus* var. *americanum*. Alternative 3 is more aggressive by targeting conditions to a low crown fire condition while Alternative 6 is less aggressive by creating or maintaining a moderate to low condition fire hazard near occurrences. However, the fact that *V. opulus* var. *americanum* occurrences on National Forest land are dispersed across a minimum of 10 watersheds from the northwestern to the northeastern to the central Black Hills greatly limits the likelihood (would not be expected) of all occurrences of ever being impacted by a single high intensity fire event (would need to be an all inclusive fire event of likely greater than 200,000 acres or cover approximately 20 to 25 percent of the land base administered by the Black Hills National Forest). Implementation of this objective near *V. opulus* var. *americanum* occurrences is expected to decrease the likelihood of occurrence loss or negative effects and benefit occurrences during a high intensity fire event. This objective is not included in the No Action Alternatives (Alternatives 1 and 2) or Alternative 4 therefore no reduction in effects associated with high intensity events would be likely under any of these alternatives.

Since at least five of the known *Viburnum opulus* var. *americanum* occurrences are located within the estimated 1.5 mile WUI circumference area (at the very edge of three) of ARC (Sturgis, Galena, Maurice, Spearfish and Sand Creek), it is likely that fire hazard reduction could be achieved near a small percentage of the occurrences in conjunction with fuel reduction efforts to be targeted near ARC (refer to Appendix G, Map G-6: At-risk Communities and Wildland-Urban Interface) that has been included in Alternative 6 (Objective 10-01). However, various ARC areas can be expected to receive treatment under all Phase II Amendment alternatives because of the tie to the legislation (refer to Appendix B of the FEIS for discussion of At-risk Communities, Wildland Urban Interface and the Healthy Forest Restoration Act). There is a great deal of uncertainty on any effects statements regarding fuel reduction treatments around ARC and *V. opulus* var. *americanum* because without a priority system or a map indicating which ARC are targeted first or to what level, it is not known if any treatments would even occur within the immediate vicinity of *V. opulus* var. *americanum* occurrences or which occurrences.

Objective 200-1 (Alternatives 3 and 6) manages for mature and late successional spruce acres (except within 300 feet of buildings in Alternative 3 and 200 feet in Alternative 6, where spruce has encroached into hardwoods or where implementing emphasis species management). Alternative 3 adds an additional exception in areas where beaver reoccupation is desired for conservation of other emphasis species. In Alternative 3, hardwood restoration is favored where spruce has encroached upon hardwoods and spruce is favored where it is encroaching into pine stands. Implementation of Alternative 6 manages for 20,000 acres of spruce, which could be at the expense of hardwood maintenance or restoration. In summary, regarding Objective 204 and Objective 200-1, Alternatives 1, 2, and 4 target retention of existing spruce at the expense of losing or reducing other types of communities, Alternative 3 can be interpreted to basically place similar emphasis on hardwoods in relation to spruce, whereas interpretation of Objective 200-01 places more emphasis on managing for spruce rather than hardwoods (by managing for 20,000 acres of spruce), although emphasis is also to be placed on hardwoods and emphasis species. Under Alternatives 1, 2, and 4, it is expected that existing *Viburnum opulus* var. *americanum* habitat would likely be conserved in the short term, but in the long-term it is expected that associated hardwoods and shrubs reduced could be lost. Under Alternative 6, it is expected that even though some habitat could be restored for this species, that managing for spruce would be expected to take precedent at the expense of some of the *V. opulus* var. *americanum* occurrences. It is expected that full implementation of Alternative 3 would be expected to better provide for conservation of existing *V. opulus* var. *americanum* occurrences as well as targeting a mix of habitat conditions for potential future colonization areas by this species.

As a conservative measure, collection and storage of *Viburnum opulus* var. *americanum* seed or other plant material, in a certified repository would be targeted under Objective 200-4 which was included in Alternatives 3, 4, and 6 for Region 2 Sensitive and Species of Local Concern plants that could be expected to be at risk from high intensity disturbance events whether natural or human-induced. No direction for collection of such material is included in Alternatives 1 and 2. Since it is not considered likely that the entire Black Hills distribution of this species would likely be impacted by a single high intensity event (similar to the earlier discussion on reducing the risk of crown fire hazard), this conservation strategy is not considered to be as needed as for species with fewer occurrences. It is likely that material could be collected from nearby *V. opulus* var. *americanum* occurrences and used for the recolonization or restoration of any occurrence locations that may be greatly reduced or lost to high intensity disturbance events.

As well as being a shrub, which makes collection of entire plants more difficult as compared to forbs and grasses, many occurrences of *Viburnum opulus* var. *americanum* are located in remote areas or access is often restricted dense shrub thicket conditions. At this time, there is no documentation of individuals being collected at the 17 occurrence locations where baseline monitoring data have been collected on the Forest (USDA Forest Service 2005d, USDA Forest Service 2004e). Therefore little to no risk is expected to the likelihood of long term persistence to this species in the Black Hills from any collection activities. In addition, the likelihood of impacts from collection are further reduced through implementation of Forest Service Manual direction (FSM 2673.2) regarding restrictions of collecting designated Region 2 sensitive plants, and is applicable to all Alternatives. This direction is further clarified through Standard 3119 which is included in Alternatives 3 and 6 to reduce the effects associated with collection activities by restricting the collection of sensitive plants (or parts thereof) to only those needed for scientific or educational purposes, or as recognized for American Indian traditions (Standard

7103) that allows for collection of Region 2 Sensitive species through consultation. This would prohibit collecting for both personal (other than for American Indian traditional uses) and commercial uses, thereby limiting the associated direct effects of plants removed from occurrences. It is unknown if this species is traditionally collected in the Black Hills. However, indications at various consultation meetings are that local American Indian interests are in maintaining plant species persistence for those species that have traditional uses. Although uncertain, the assumption is that traditional uses and scientific collections may be expected to directly affect a limited number of individual shrubs. Another assumption is that it would likely not be expected that if a very limited number of plants are collected that traditional collection would present a significant risk to the overall long term persistence of this widely distributed, multi-reported species on the Black Hills National Forest. Alternatives 1, 2 and 4 do not include Standard 3119, however, those alternatives do have a version of Standard 7103; however, the version in those alternatives does not specify consulting on Region 2 Sensitive Species collection.

Designation of an area as a Research Natural Area would further restrict activities that would typically occur or be associated with most management area direction (see Appendix D Management Area (MA) 2.2 - Research Natural Area direction). An occurrence (site number 94S490B) of *Viburnum opulus* var. *americanum* is reported from within the Cranberry Spring's candidate RNA boundary that is included in Phase II Amendment Action Alternative 4. Cranberry Springs is not a candidate RNA in the designated preferred Alternative (Alternative 6) or in the other Action Alternative (Alternative 3). The No Action Alternatives (Alternatives 1 and 2) do not include any of the candidate RNAs. The *V. opulus* var. *americanum* occurrence located within the candidate Cranberry Springs site is currently included within MA 3.7 (Late Successional Forest Landscapes) which has restrictions on various activities (see the LRMP section MA 3.7 – Late Successional Forest Landscapes), primarily vegetation treatment activities to target the management of these areas for late successional characteristics, therefore it is expected that general effects to the reported occurrence is considered to be relatively similar regardless if the site would potentially be designated as an RNA or if the area continues to be managed under the existing management area direction. Management under either would be expected to continue conifer expansion and the likely reduction of hardwood and shrub communities that could be expected to contribute to reducing the likelihood of the persistence of the reported occurrence. The *V. opulus* var. *americanum* occurrence is one of the reported sites where grazing occurs within the general vicinity; however, the report from the site did not document whether any effects were observed to *V. opulus* var. *americanum* from livestock use in that area. If the Cranberry Springs candidate RNA was proposed through the Phase II Record of Decision grazing suitability would be evaluated (Standard 2.2-2501) prior to any designation and livestock use could be expected to be restricted at this location. Restriction of livestock would be expected to remove any effects associated with that activity, either negative or beneficial to the species at that occurrence location. *V. opulus* var. *americanum* is not known to occur within any of the other candidate RNAs; however, the Sand Creek candidate RNA (included in Alternative 4) is within less than five miles of a *V. opulus* var. *americanum* occurrence and has similar associated habitat conditions and species to other occurrences so it is possible that *V. opulus* var. *americanum* individuals could be located within that candidate RNA location. It is unknown if site proposal through the Phase II Record of Decision to be designated as an RNA would have any effect to the species since it is unknown if *V. opulus* var. *americanum* occurs within the candidate boundary. However, as described in the Cranberry Springs candidate RNA discussion

above, it can be expected that various activities (including Off Road Vehicle use which is documented to be increasing in that vicinity) would likely be restricted and the use of livestock would be evaluated if the area was proposed for designation. A restriction of various activities that are associated with the current management of the area as managed under MA 3.7 – Late Successional Forested Landscapes, MA 4.1 - Limited Motorized Use and Forest Product or MA 5.1 Resource Production Emphasis (see the LRMP sections for MA 3.7, MA 4.1 and MA 5.1 for management direction) could have either negative (high fire hazard near occurrences or later seral stages potentially resulting in few associated hardwood or shrub conditions) or beneficial effects (reduction of a potential ongoing activity or condition at an unreported occurrence location which could be impacting an individual). In addition, Standard 2.2-3201 could potentially be expected to benefit the species since habitat may be manipulated within the boundary if it were necessary to perpetuate natural ecological processes or benefit designated threatened, endangered, or sensitive species if either of the two candidate areas mentioned above were proposed through the Phase II Amendment Decision.

Guideline 2206 in Alternative 1, which is treated as a Standard in Alternative 2 and retained as a standard for Alternatives 3, 4, and 6, prohibits new developed recreation sites from being placed in aspen/birch stands. Although it is generally unlikely that a developed recreation site would be placed in a dense shrub thicket or steep slopes such as where many occurrences of this species is documented to occur (USDA Forest Service 2005d), this guideline or standard could be expected to reduce any negative effects and would be considered beneficial if a recreational site were to be proposed where a *Viburnum opulus* var. *americanum* occurrence may be located under any of the Phase II alternatives.

Viburnum opulus var. *americanum* occurs (approximately 23 percent of the currently reported locations) in the Dugout Gulch, Higgins Gulch and Bear/Beaver Gulches Botanical Areas (MA 3.1). Many relevant conservation measures applicable to *V. opulus* var. *americanum* for designated Botanical Areas already exist and are common to all alternatives. There are no proposed changes to the following existing Botanical Area standards and guidelines in the Phase II Amendment: 3.1-1501, 3.1-2101, 3.1-2102, 3.1-2501, 3.1-2502, 3.1-4102, 3.1-5101, 3.1-5102, 3.1.-5103, and 3.1-9104 (see Management Area 3.1 – Botanical Areas in the LRMP 1997). These generally provide protection of botanical values (such as Region 2 Sensitive plant species such as *V. opulus* var. *americanum*) when implemented by withdrawing areas from mineral entry when necessary, and by not generally including these botanical areas towards the suitable timber base or allowable sale quantity. Regarding the listed standards and guidelines above, the following have generally only been permitted when the values for which the Botanical Areas were designated were not at risk: livestock use and recreation activities. The following are allowed in Botanical Areas when they generally enhance or protect the values for which the Botanical Areas were designated: various developed improvements (such as fencing), the use of prescribed natural fire, the use of closure orders when necessary, and construction of new roads and trails, only when necessary for interpretive or educational purposes or to correct existing or ongoing resource damage.

The following objectives, standards, and guidelines are expected to further limit adverse direct and indirect effects and contribute to the conservation of species such as *Viburnum opulus* var. *americanum* under various Phase II Amendment alternatives within designated Botanical Areas (MA 3.1):

- Objective 3.1-201 targets maintenance or enhancement of botanical features at Botanical Areas in Alternatives 1, 2, and 4. In Alternatives 3 and 6, monitoring is added to this targeted objective to determine if this is being achieved.
- Standard 3.1-1001. The existing standard in the Phase II Amendment No Action Alternatives 1 and 2 and in Alternative 4 is to provide for the protection of the unique biodiversity, geological, historical, and paleontological values, along with the botanical values for which the Botanical Areas was designated. No new mineral material permits are to be issued for this management area. Alternatives 3 and 6 revises the wording to clarify that the standard is also to provide further protection for additional botanical values (such as *Viburnum opulus* var. *americanum* that is relatively new to the Region 2 Sensitive Species list) that may continue to be discovered in the future as well as for those botanical values for which the area was designated as a Botanical Area.
- Standard 3.1-2503. Alternatives 1 and 2 generally provides protection of Region 2 Sensitive plants in designated Botanical Areas from adverse direct effects of domestic authorized livestock grazing. In Alternatives 3, 4 and 6 the standard requires that livestock will be restricted from accessing Region 2 Sensitive and Species of Local Concern plant species. Furthermore, it adds that if monitoring documents that domestic livestock are not restricted from accessing Region 2 Sensitive and Species of Local Concern plant occurrences by natural features within Botanical Areas, then method(s) will be implemented to remove the cattle access from the occurrences. Although current levels of livestock use are generally not currently considered a risk to the continued persistence of *Viburnum opulus* var. *americanum* in the Black Hills, the refined standard in Alternatives 3, 4, and 6 could be expected to benefit the conservation and likelihood of the long term persistence of *V. opulus* var. *americanum* by removing any livestock impacts to this species within Botanical Areas.
- Standard 3.1-4101 manages fire and fuel through control practices and prescribed fire to protect values of Botanical Areas in the Phase II Amendment No Action Alternatives (Alternatives 1 and 2). For Action Alternatives 3, 4, and 6, Minimum Impact Suppression Tactics (MIST) for targeting the containment and control of wildfire is required as compared to more aggressive actions that could still be used for Alternatives 1 and 2. If implemented, MIST fire suppression efforts are expected to result in less intensive disturbances if a fire would occur within the Botanical Areas, and would be expected to result in fewer direct and indirect effects to *Viburnum opulus* var. *americanum.*
- Guidelines 3.1-9101, 9102 and 9103 restrict vehicle use (including snowmobiles) to designated routes and prohibit off road travel in all alternatives. For Alternatives 3, 4, and 6, these have been reworded to recognize emergency and administrative access needs, and the guidelines were elevated to standards.

There are no changes in the Phase II Amendment alternatives to specific management area direction for MA 3.32 – Backcountry Non-motorized Recreation Emphasis or MA 5.2A – Fort Meade VA Hospital Watershed under any of the Phase II alternatives; therefore, no changes in direct or indirect effects specific to those management areas to Region 2 Sensitive plant pecies such as *Viburnum opulus* var. *americanum* occurrences are expected between alternatives.

The Phase II Amendment action alternatives target a greater expanse of later succession conditions within MA 3.7. In Alternatives 1, 2, and 4 from “Manage each contiguous unit within

this MA as a late-successional landscape, so that late successional structure is always present within some portion of each unit" to "Manage each contiguous unit within this MA as a late-successional landscape" in Alternative 3. Alternative 6 (Objective 10-01) targets fuel reduction in various management areas, which includes some late successional landscape areas to be treated to reduce fire hazard conditions near buildings areas designated as At Risk Communities. Because fire suppression has contributed to conifer encroachment into hardwoods, management that targets late succession would be expected to continue to contribute to a decline in the associated hardwood habitat conditions which could affect the *Viburnum opulus* var. *americanum* occurrences within MA 3.7. If occurrences are located near buildings or ARC in this management area in areas treated for fuel reduction in Alternative 6 (preferred alternative), it is assumed that some of those treatments could include hardwood restoration, so some *V. opulus* var. *americanum* occurrences under Alternative 6 may not be as subject to conifer encroachment effects from later successional conditions, and could be expected to benefit from the removal of the conifers.

Viburnum opulus var. *americanum* occurs (approximately 56 percent of currently reported locations) in MA 4.1 – Limited Motorized Use and Forest Product Emphasis 5.1 – Resource Production Emphasis, MA 5.4 – Big Game Winter Range Emphasis, and MA 5.6 – Forest Products, Recreation, and Big Game. Very few changes are included in specific direction for these MAs for the Phase II action alternatives (Alternatives 3, 4 and 6), other than those that affect ponderosa pine structural stages. The assumption is that these ponderosa pine structural stages would be designed to occur across planning unit areas, such as watersheds, and would not be expected to conflict with targeting reduction of high intensity crown fire risk near *V. opulus* var. *americanum* occurrences, and therefore would generally not be expected to result in beneficial or negative effects to *V. opulus* var. *americanum*. Standard 5.6-2101 maintains existing stands and acres of hardwoods in Alternatives 1, 2, and 4. The standard was revised in Alternatives 3 and 6 and includes maintaining or expanding hardwoods, which could be expected to have beneficial effects for the species by removing encroaching conifers and potentially maintaining or restoring areas of habitat conditions suitable for *V. opulus* var. *americanum* persistence or colonization (if other microsite conditions exist).

Basic monitoring direction for Region 2 Sensitive Species is provided in FSM 2670 and Chapter 4 of the LRMP (1997) and by the Phase I Amendment to the 1997 LRMP. However, the direction does not specify the type and level of information that is needed in the monitoring. Monitoring in the form of initial baseline data collection is currently occurring for *Viburnum opulus* var. *americanum* since it is a relatively new (December 2003) species on the Region 2 Sensitive Species list with a relatively large number of reported locations on the Black Hills and more continuing to be discovered (USDA Forest Service 2005a). Forest monitoring direction has been revised during this amendment process and is included in Chapter 4 of the LRMP, as amended by the Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction). Information on the current monitoring design for *V. opulus* var. *americanum* is provided in the Forest Plan Monitoring Implementation Guide (USDA Forest Service 2005b).

4-1.5.2 Cumulative Effects

The indirect and cumulative effects analysis for species persistence is bounded in time as the

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

The spatial scale for cumulative effects analysis of Phase II Amendment alternatives for this plant species is smaller then generally encompasses the Black Hills Ecoregion as defined by Bailey (Bailey, 1995). The spatial area used for the cumulative effects analysis for *Viburnum opulus* var. *americanum* is larger than many of the sensitive plant species since it is well-dispersed within 10 sixth level watersheds. The spatial area used for the cumulative effects analysis primarily includes the north central to northeastern to northwestern Black Hills (occurrences are located within the Redwater River Lower Belle Fourche River Middle Cheyenne River-Elk and Rapid Creek fourth level hydrologic unit code watersheds). This area was chosen because it encompasses similar ecosystem components to where the known occurrences are located.

There are a significant number of parcels of private land distributed throughout the primary concentration areas (northeastern and northwestern Black Hills) of where *Viburnum opulus* var. *americanum* occurs. A few individual shrubs have been observed on adjacent private land and it is assumed that other private lands within the general area contain occurrences as well as potentially suitable associated habitat conditions for the species. However, occurrences on many of these adjacent lands are not known; therefore, the effect of any associated management actions on this species is also unknown.

Documentation from baseline monitoring data gathering efforts and past reports indicate various levels of insect use (insect larvae predation of portions of leaves) ranging from low levels to higher levels of leaf defoliation (USDA Forest Service 2005d). Defoliation of leaves was documented from later season data collection dates (from July or later in the season). There are obvious direct defoliation effects to various occurrences of *Viburnum opulus* var. *americanum* but it is unknown if the species is tolerant to this effect (species has evolved with this insect predation) or if the long-term persistence of this shrub species could be affected.

Habitat trend for the limited riparian portion of *Viburnum opulus* var. *americanum* occurrences for this species on the Forest is considered to be likely downward when compared to historic riparian conditions (USDA Forest Service 2003c). However, as stated earlier, many of the occurrences or portions of occurrences are located on steep slopes and dense shrub thickets and are not associated with riparian areas, and those occurrences would not be associated with downward trends of riparian habitats compared to historic conditions. Fire suppression since European settlement of the Black Hills has probably contributed to conifer encroachment of *V. opulus* var. *americanum* occurrence areas that may be having cumulative effects to the deciduous habitat associates and to this species.

Activities and effects on *Viburnum opulus* var. *americanum* were discussed in the section based on the current locations of designated ARC (refer to Map G-6 in Appendix G: At-risk Communities and Wildland-Urban Interface). This map is subject to change, with the potential that more areas could likely be designated as ARC (refer to Appendix B of the FEIS for discussion of At-risk Communities and the Wildland-Urban Interface for more information),

with fuel reduction actions to occur within an estimated 1.5 mile WUI circumference area around those designated areas. It is uncertain how this expected revision of the list will result in changes in placement of, or levels of treatments around species occurrences, and how effects would be expected to change.

Although no impacts to the species has been noted recently from off road vehicle use (primarily All Terrain Vehicle or ATV traffic), it may be possible that a few individuals could be impacted by this activity. High levels of off road activities have been noted in the Black Hills near where some of the *Viburnum opulus* var. *americanum* occurrences are located. However, since these plants are shrubs and individuals are often located within dense shrub thickets which would be difficult to traverse through in motorized vehicles such as an ATV; it is unlikely that this increasing activity would be expected to have much impact on the long term persistence of this species. The Forest is currently working on a travel management plan that is expected to address issues and effects associated with off road vehicle use.

As described in the Direct and Indirect Effects section above, Alternatives 3, 4, and 6 target additional conservation measures (e.g., Objective 200-04) designed specifically for conservation of species such *Viburnum opulus* var. *americanum*. Therefore the least risk to the species long term persistence in the Black Hills would be expected with full implementation of Alternatives 3, 4 and 6. Although there is uncertainty, the overall order of the five alternatives considered in Phase II from highest to lowest in terms of the likelihood of persistence for *V. opulus* var. *americanum* is: Alternatives 3 and 6, followed by 4, then by 2 and 1.

4-1.5.3 Determination and Rationale

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing (USDA Forest Service 2005c) is made for *Viburnum opulus* var. *americanum* for all Phase II alternatives**.** The rationale for this determination is that in addition to the increasing numbers of geographically dispersed occurrences that are being found, several standards and guidelines under each alternative address the various potential risks to this species, as described earlier. Other conservation strategies and measures that vary by alternative provide for conservation or enhancement of *Viburnum opulus* var. *americanum* habitat conditions, and *ex situ* collections of plant material are expected to be available for re-introduction if needed. Specifically, the above determination for *Viburnum opulus* var. *americanum* is based upon the following assumptions:

1. The determination is made for the remaining life of the 1997 Plan with associated amendments and determinations will be re-evaluated during any future amendments or revisions to the Forest Plan (currently expected targeted revision Decision date is 2012).

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

3. That regardless of which alternative is selected, the species will be monitored according to the current monitoring protocol (or as altered through reassessment with the Rocky Mountain Research Station), which is currently designed to attempt to

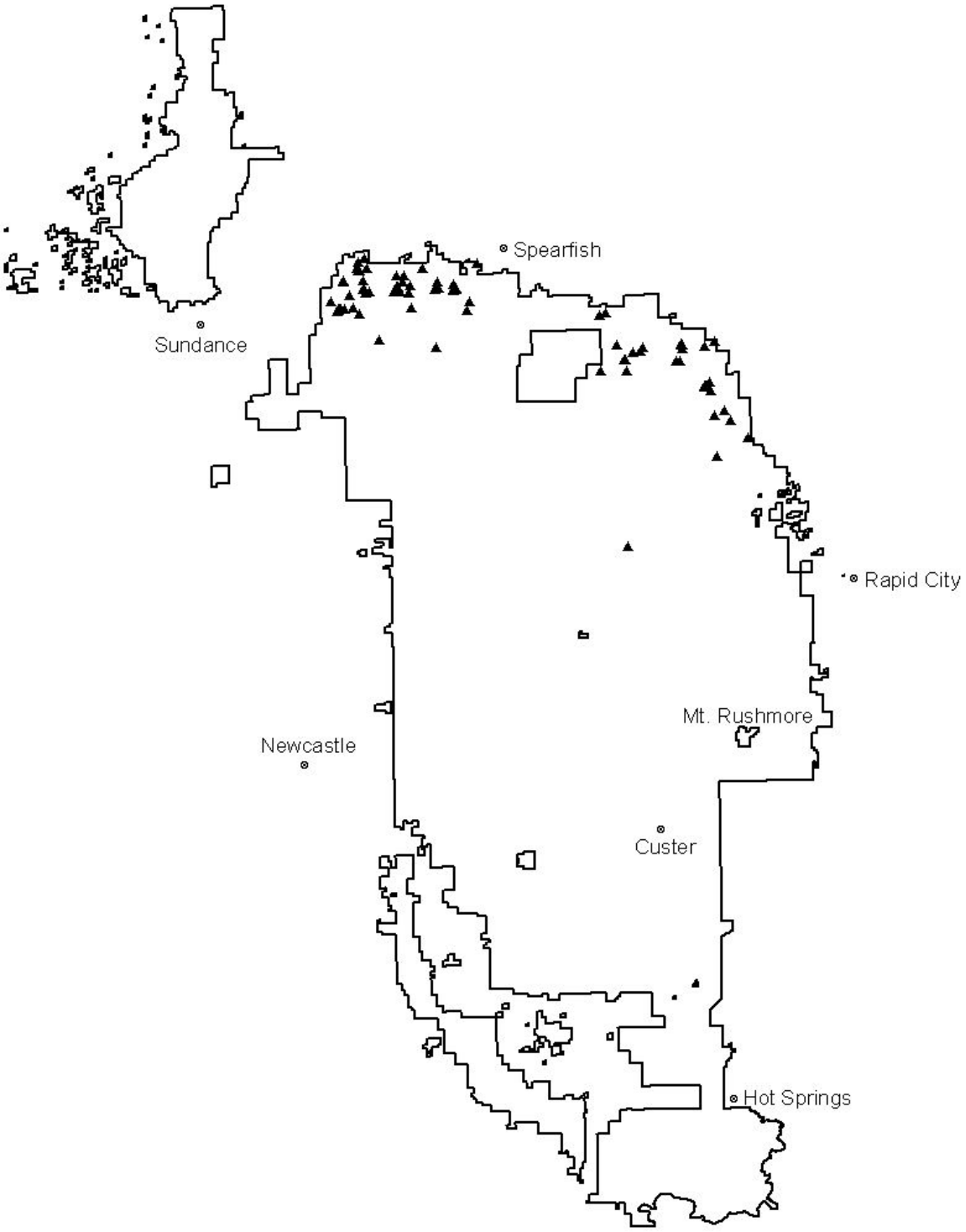
relocate a number of the previously reported locations and gather baseline monitoring data (USDA Forest Service 2005b).

4. That regardless of which alternative is selected, any allotment supporting *Viburnum opulus* var. *americanum* occurrences that are currently vacant will remain vacant.

5. That plant material collected on the Forest can be used to successfully re-colonize all (or portions of) occurrences in the event such sites are lost and determined that they would not be able to re-colonize naturally.

6. That a limited number individuals are likely to be impacted from various disturbances, including but not limited to the following: long-term occurrence conservation efforts, conservation efforts targeted for other species, or from catastrophic events.

General distribution of *Viburnum opulus* var. *americanum* (Highbrush Cranberry)on lands administered by the Black Hills National Forest



4-1.6. *Salix candida* (Sageleaf Willow)

This species was included on the revised Region 2 Sensitive species list effective December 2003 (USDA Forest Service 2003) and remained on the updated Region 2 Sensitive Species list, effective May 17, 2005 (USDA Forest Service 2005c); therefore, information is not currently available in Black Hills National Forest programmatic level documents to which to tier.

Salix candida (known also as hoary willow or sage willow in addition the name listed above) is known to occur from eastern Canada to Alaska, across the northern United States, and south to Colorado, Illinois, and Indiana (NatureServe 2004, Glisson 2003). There are six occurrences of *S. candida* in South Dakota. The largest of these occurs within the designated McIntosh Fen BA (MA 3.1) on land administered by the Black Hills National Forest. The other five occurrences occur in the northeastern part of the state, the closest of which is a minimum of 100 miles away (Glisson 2003). A 1924 Black Hills record of this species, located on private land, has not been relocated since that time (Glisson 2003). Although the Forest has not specifically targeted the species during surveys until recent years (Glisson 2003), it has been a species of interest for Wyoming and South Dakota. Because no other reports have been made to the state since they have recognized the species as being of interest, that this is a easier willow to identify than a number of the other willow species (has a very light sage green color), and that it has been targeted for survey by the Forest in recent years at sites that have some similar habitat conditions and has not documented, it is not expected that there are any other occurrences located elsewhere on Forest lands.

Baseline data have been collected for *Salix candida* at the McIntosh Fen occurrence in 2002 and 2003 (USDA Forest Service 2004c). This information was used for the design and 2004 monitoring of the occurrence (USDA Forest Service 2004c, USDA Forest Service 2004e, USDA Forest Service 2005a, USDA Forest Service 2005b).

Individual counts of *Salix candida* collected during monitoring at the McIntosh Fen BA have increased since 622 individual plants were documented 2002. The following numbers of *S. candida* individuals were recorded: 734 plants in 2003 (Black Hills National Forest Plant Database 2003) and approximately 1,351 plants in 2004 (USDA-Forest Service 2004e).

Salix candida is primarily a northern species, which is rare here largely because wetlands meeting its habitat requirements are uncommon toward the southern edge of its distribution. Accordingly, the species is currently assigned a rank of “critically imperiled due to extreme rarity” (S1) in South Dakota and “imperiled” (S2) in Wyoming (NatureServe 2005, Glisson 2003).

Salix candida is an obligate wetland deciduous shrub that grows to approximately five feet tall. The flowering period is in May for South Dakota, with fruits produced in May and June (Glisson 2003). The species is dependent on inundated and saturated soils. Across the species range, it is found in habitats such as swamps, bogs, fens, stream banks, and lakeshores that are often in calcareous areas. In northeastern South Dakota it is restricted to cool, boreal remnant fen and seep habitats (Glisson 2003). The species appears to have a high tolerance to fire and may require anaerobic soil conditions (Glisson 2003). Beaver activity may also be important in maintaining occurrences of *S. candida* (Glisson 2003).

4-1.6.1 Direct and Indirect Effects

The long-term persistence of *Salix candida* in the Black Hills is uncertain. The persistence of this species in the Black Hills is contingent on conserving the single occurrence at McIntosh Fen. The associated habitat conditions for *S. candida* is very limited, and no other potential habitat for the species is presently known on the Forest (Glisson 2003), which makes the known occurrence vulnerable to high intensity (catastrophic) and stochastic events. Because this is an obligate wetland species, which may require anaerobic conditions, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced (USDA Forest Service 2004c, Glisson 2003). Noxious-weed invasion effects pose potential risk to the specie's long-term persistence on the Black Hills. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen BA although high soil moisture levels in the fen itself appear to exclude *C. arvense* from the *S. candida* location. *Lythrum salicaria* (purple loosestrife) is not known to occur at either of the sites or anywhere close by but is very aggressive and has the potential to out compete riparian natives, including *S. candida*. Insects, such as stem borers, have been documented on another rare willow species in the Black Hills (Hornbeck et al. 2003a) but have not been documented to occur on *S. candida* at McIntosh Fen. A metallic green beetle was documented on willow species, including *S. candida* in 2003; however, no insect foraging use was noted on the willow leaves or stems (Black Hills National Forest Plant Database 2003). Fishing occurs along Castle Creek (near the fen), and a designated snowmobile trail crosses the BA but does not extend into the *S. candida* occurrence. At this time, no impacts have been documented to the willow from either activity (USDA Forest Service 2004e, USDA Forest Service 2005a). No impacts have been documented from wildlife use or trespass cattle although there may be a potential for some direct effects.

Conservation measures are currently being implemented to conserve and enhance McIntosh Fen, where *Salix. candida* is located. All Phase II Amendment alternatives include conservation measures for the Botanical Area as well as for other riparian and wetland areas; in addition Alternatives 3 and 6 contain more extensive measures to reduce the likelihood of any adverse effects and benefit the conservation of *S. candida*. Conservation measures include prohibiting authorized livestock use (Standards 2505c and 3.1-2503), limiting vehicle use to designated routes within the McIntosh Fen BA (Standards 3.1-9101, 9102, and 9103), and prohibiting adverse disturbances from developments (Standards 5200-1 and 3106 a-c and Guidelines 3607 a-c). In addition, measures to collect and maintain genetic material for expanding or restoring occurrences (similar to the local *Salix serissima* collection and off site propagation efforts and planting efforts that have occurred at McIntosh Fen) (Objectives 200-04) are targeted for implementation under Alternatives 3 and 6.

Habitat conservation or enhancement measures that could be expected to conserve existing levels or increase water tables at the *Salix candida* occurrence include management activities that restore conditions favorable to the long-term goal of successfully reintroducing beaver into Castle Creek near the McIntosh Fen occurrence. All alternatives seek to maintain or restore historic wet areas, wet meadows, and beaver (Objective 215). Any successful restoration of hardwoods (aspen), and reintroduction of beaver (Objective 215) along adjacent Castle Creek at McIntosh Fen and just upstream of the Fen along Castle Creek and Silver Creek would be expected to conserve or improve saturated soil conditions that could contribute to the likely long-term persistence of *S. candida* on Forest lands. In addition, Objective 214 targets restoration of

500 acres of riparian-shrub communities under Alternatives 1, 2, 4 and 6, and is increased to a 1, 000 acre target in Alternatives 3. With additional acres targeted in Alternative 3, there is a greater likelihood that riparian restoration would be expected to occur in the vicinity of McIntosh Fen and Alternative 3 would be expected to be more beneficial to the species long-term persistence associated with this conservation measure. Alternative 6 prioritizes riparian restoration efforts in areas surrounding Federal Register designated ARC (see Appendix G to the EIS, Map G), which could benefit *S. candida* at McIntosh Fen since activities are expected to occur within 1.5 miles of the designated Deerfield ARC (refer to Appendix B of the FEIS for ARC and the WUI discussions). There is a great deal of uncertainty on any effects statements regarding treatments around ARC and *S. candida* because without a priority system or a map indicating which ARC are targeted first or to what level, it is not known if any treatments would even occur within the immediate vicinity McIntosh Fen.

Objective 215 targets the rehabilitation of riparian habitats along three stream reaches under Alternatives 1, 2, 4, and five stream reaches under Alternative 3 and 6. If these activities under any of the alternatives were prioritized to occur immediately adjacent to McIntosh Fen then it is expected that the effects to the overall hydrologic function of the general fen area would benefit and would be expected to benefit *Salix candida* persistence on Forest land.

Recognizing noxious weeds and other invasive plants and their treatment as a primary risk to the species' long term persistence on the Black Hills, conservation strategies and measures to address and reduce direct and indirect effects are given priority discussion in this section. All alternatives target various levels of conservation and protection for Region 2 sensitive species from noxious-weed invasion and treatment. Objective 231 is included in all alternatives to target prevention and reduction of noxious-weed invasion into native plant communities. In Alternatives 1 and 2 the targeted objective is to treat 3,600 acres per year. Targeted treatment acres are increased to 6,000 acres per year in Alternatives 3, and 4, and are further increased to a minimum of 8,000 acres in Alternative 6. Guideline 4303 revised the priority order for treatment of weeds, and first priority is that treatment is to occur at Region 2 sensitive and Species of Local Concern plants and snails. Guideline 4304 (Alternatives 1 and 2) was revised and elevated to a standard in Alternatives 3, 4, and 6, using treatment methods that pose the least risk to the species being protected. Alternatives 1 and 2 do not include the monitoring of weed control effectiveness at Region 2 sensitive species sites to determine if weeds at those sites need to be retreated throughout the season to reduce noxiousweed competition. Standard 4300-1 specifies this type of monitoring and is included in Alternatives 3, 4, and 6 to further address the risks that noxious weeds present to Region 2 plant species such as *Salix candida*. Alternatives 1 and 2 require the use of certified noxious-weed-free seed, feed and mulch on the Forest (Standard 4306). This standard was revised to require that the seed be tested at time of purchase to confirm that the seed is weed-free. Mitigation of noxious weed invasion into native plant communities by re-vegetating with native species is included as a Guideline (1110) in Alternatives 1 and 2. The original guideline was revised and was elevated to a standard in Alternatives 3, 4, and 6 (Standard 1110). Since noxious weed occurrences and various species are becoming more prevalent on the Forest (USDA-Forest Service 2003b) and lands of other ownership, as well as being identified as one of the primary risks for *S. candida* (USDA-Forest Service 2004c, Glisson 2003), the assumption is that Alternatives 3, 4, and 6 would have a greater reduction in risk of indirect and direct impacts to *S. candida* from noxious weeds and their treatment (see Section 3-6.3 Noxious Weeds).

Because the *Salix candida* occurrence is located within the fenced area of McIntosh Fen BA that restricts activities and associated effects, other standards and guidelines that limit effects from those activities would be expected to have little direct influence S. candida. However, if the standards and guidelines are implemented upstream it would be expected that they would indirectly generally contribute to saturated conditions at the *S. candida* site. Standards 1306 and 1505 and Guidelines 1303 and 9108 (all alternatives) would be expected to contribute towards the maintenance or conservation of the integrity of existing riparian areas from authorized activities on Forest Service administered lands, such as timber management, mining, roads, recreation, livestock use, and vehicle use. Guidelines 2505 and 2507 (Alternatives 1, 2, and 4) direct that management of grazing in riparian areas is to a residual level; under Alternatives 3 and 6, these guidelines are strenthened to standards to target the objective of enhancing riparian habitat conditions.

Although disturbance activities at the McIntosh Fen are not generally expected, implementation of some conservation activities may result in some limited amounts of disturbance. Any activity that would be expected to result in soil disturbance would be subject to meeting Standards 3106a, b, and c under Alternatives 3 and 6 and expected to meet Guidelines 3107a, b, and c under Alternatives 1, 2, and 4 to keep any effects associated with the disturbance activity to a minimum.

Because conifer encroachment has been recognized as a risk to the species (indirectly through the conservation section of Glisson 2003), a widespread reduction in the amount of conifer cover in the Castle Creek watershed that may be caused by wildfire; large scale mountain pine beetle (MPB) infestations currently present within the watershed (USDA Forest Service 2003f); intensive fuel reduction thinning; or insect management activities to the extent that a water table increase could actually be realized at the known *Salix candida* occurrence could conserve or increase the extent of saturated soil conditions and would be expected to benefit the species. Various areas of higher mountain pine beetle hazard ratings would be expected to be reduced under all alternatives as vegetation treatments occur. Alternative 6 emphasizes more treatment acres reducing fire hazard and risk (see Section 3-7.2), with priority of treatments focused near designated At Risk Communities (ARC).

Objective 200-01 was originally designed for Alternatives 3 and 6 to address a variety of risks associated with conifer encroachment for a number of the emphasis plant species. The objective was designed to favor hardwood restoration where spruce has encroached into hardwoods and where beaver reoccupation is desired to target conservation of the species. The removal of conifers (including spruce) at or near McIntosh Fen, with the intent of rejuvenating aspen for the long-term reoccupation by beaver to conserve and enhance saturated conditions, is expected to be a primary contributing factor for the species' long-term persistence. Revision of objective wording that is now contained in Alternative 6 still indicates that a treatment of spruce is still to occur, however, at least 20,000 acres of spruce is to be managed for under the alternative and it is uncertain that spruce encroachment removal desired at or adjacent emphasis plant species locations can be achieved. Therefore it is not known if Alternative 6 would be as successful at targeting this conservation measure for emphasis plant species as Alternative 3. No version of this objective is included in Alternatives 1, 2, and 4. Alternative 2 and 4 directs maintenance of existing patch size of white spruce structural stages (Standard 3215), which can significantly limit or prohibit the likelihood of hardwood restoration acitivities identified as beneficial for the

long term persistence of some emphasis plant species, such as *Salix. candida*. This standard was revised for Alternatives 3 and 6 and identifies maintenance of canopy closures (40-50 percent) for marten corridors. Although not specified in the standard and actual site implementation is uncertain, it is assumed that this canopy closure would be composed primarily of conifer species rather than hardwoods. Therefore, in order to provide for for other species associated with hardwoods, it is assumed that at the project design and implementation level that the connectivity corridor design and placement would include consideration of hardwood restoration and could still provide beneficial effects for long term persistence of species such as *S. candida*. Alternative 1 does not specifically address the removal of spruce encroachment into hardwoods or maintenance of canopy connectivity corridors. Refer to the section on marten in this Biological Evaluation for more information on spruce maintenance and connectivity corridors.

Objective 200-04 was designed into Alternatives 3, 4, and 6 for the Phase II Amendment for conservation of species, particularly *Salix candida* with a single or limited number of occurrences, where the Black Hills population is expected to be at higher risk from a direct or indirect loss to catastrophic events. Objective 200-04 provides for the collection of material from Black Hills for reintroduction efforts into occurrence sites that were lost to some type of disturbance event, and where there it is likely that re-introduction efforts would be expected to be successful. No direction for collection of emphasis plant species material is included within Alternatives 1 and 2.

Basic monitoring direction for Region 2 Sensitive Species is provided in FSM 2670 and Chapter 4 of the LRMP (1997) and by the Phase I Amendment to the 1997 LRMP. However, the direction does not specify the type and level of information that is needed in the monitoring. *Salix candida* monitoring is designed to detect changes in the occurrence and respond with actions, if needed (USDA Forest Service 2005a). Forest monitoring direction has been revised during this amendment process and is included in Chapter 4 of the LRMP, as amended by the Phase II amendment (refer to the Phase II amended Black Hills National Forest LRMP Chapter 4 for further discussion of monitoring direction). Information on the current monitoring design for *S. candida* is provided in Forest Plan Monitoring Implementation Guide (USDA Forest Service 2005b).

Forestwide Guideline 8101 (all alternatives) prioritizes lands with riparian areas and streams for land acquisition. Acquisition of the any of the land upstream of the McIntosh Fen occurrence along Castle Creek would be expected reduce the potential of development. However, this area would also be priority for acquisition because of the downstream sensitive plant occurrences. Acquisition would be dependent upon funding, land availability, and landowner willingness to participate. If land above the McIntosh Fen area could be acquired this action would be expected to reduce the potential for long-term indirect effects (associated with the development of buildings, roads, culverts, septic systems, etc.) from potential hydrological alterations that could reduce saturated conditions and pose risks to the long term persistence of *Salix candida*.

Specific MA objectives, standards, and guidelines are expected to benefit the *Salix candida* occurrence at McIntosh Fen BA (MA 3.1):

- Objective 3.1-201 requires maintenance or enhancement of botanical features at BAs in Alternatives 1, 2, and 4. In Alternatives 3 and 6, monitoring to see if this target is being