

Black Hills National Forest  
Noxious Weed Management

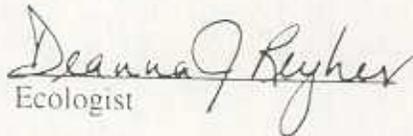
# Biological Assessment And Biological Evaluation

Threatened, Endangered and Sensitive Species

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# **BIOLOGICAL ASSESSMENT and BIOLOGICAL EVALUATION FOR NOXIOUS WEED MANAGEMENT**

## **Introduction**

This Biological Assessment/ Biological Evaluation analyzes the potential effects on federally listed Threatened and Endangered species and R2 Sensitive Species that are known or suspected to occur on the Black Hills National Forest. This combined Biological Assessment (BA) and Biological Evaluation (BE) was prepared for noxious weed management on the Black Hills National Forest as required by section 7 of the Endangered Species Act (ESA), as amended, and the USDA Forest Service Threatened, Endangered, and Sensitive, Plant and Animal Species Policy (FSM 2670). This document describes the occurrence of and the effects on species that are Federally listed or proposed for Threatened or Endangered status. This document also serves as a BE by including equivalent information on Forest Service, Region 2 Sensitive species. The BE is not required under ESA, but is required by the Forest Service for internal programs and activities (FSM 2672.4). FSM 2672.42 and 2672.43 establishes standards and suggested procedural 'steps' for conducting biological evaluations. The Region 2 supplement 2600-94-2 provides Regional direction on steps for conducting a BE.

## ***Project description***

### ***Alternative 1 - No Action (Current Management)***

This is a required alternative that provides a baseline against which impacts of the Proposed Action are measured and compared. In addition, under this alternative, noxious weed management, including application of integrated control methods, inventory/mapping, and public prevention, would continue to be implemented on the Forest in association with scheduled Forest projects (treating approximately 3,500 acres per year).

### ***Alternative 2 - Proposed Action***

The Proposed Action was developed to fully meet the purpose and need for the project and to implement direction for noxious weed management in the Forest Plan and R-2 Noxious Weed Management Strategy.

The proposed action is a comprehensive plan comprised of an array of site-specific goals and objectives, and strategy elements designed to manage the spread and establishment of noxious weeds on existing, predicted infestation from scheduled Forest activities, and news infestations occurring on NFS lands not covered under scheduled Forest projects. The alternative treats a minimum 6,000 acres of NFS lands (3,000 acres above the No Action alternative), and provides for broader application of weed plan strategy elements Forest-wide, including: annual mapping, inventory, and monitoring evaluation of an additional 3,000 of weed infestations, development of grants and agreements with all Black Hills counties and affected stakeholders that will expand the scope of noxious

weed management within the Forest, and increase the scope of noxious weed prevention/education strategies.

### ***Features Common to Both Alternatives***

The alternatives include the following features:

#### Prevention and Education.

- The Forest will lead and provide for annual training and education seminars for Forest personnel, federal, state, and county agencies, Forest user groups, and the public to recognize new noxious weed invaders and understand Forest direction and implementation of the comprehensive weed plan. The Forest will develop and implement a public education program for noxious weed management.
- The Forest will develop/incorporate Forest Plan Best Management Practices (BMPs) for soil protection and re-vegetation (seeding) to mitigate establishment and spread of noxious weeds for scheduled Forest projects.
  - Noxious Weed Best Management and Prevention Practices identified in the USDA – Guide to Noxious Weed Prevention Practices are specifically incorporated in the proposed action and all prevention practices are to be implemented in accordance with Forest Plan direction as appropriate (USDA Guide, July 2001).
- Develop and implement project risk assessments and attendant mitigation measures to mitigate and prevent the introduction and spread of noxious weeds from Forest activities scheduled over the coming decade, including road maintenance/construction; prescribed and timber slash burning; timber removal practices; grazing management; land exchanges; and recreation trails/construction.
- Employ clauses for weed prevention in all Forest contracts and permits as practical. In situations where Forest projects are scheduled to occur on areas infested with high densities of noxious weeds that are considered to be at high risk for spread, or priority management species, established provisions for equipment washing will be required to mitigate spread and establishment of noxious weeds to adjacent NFS lands and jurisdictions.
- Post and implement weed forage signing and regulations such as the BHNF Certified Weed-Free Hay, Mulch, Straw, and Forage Special Restriction, and do compliance checking.
- Require use of certified noxious weed free seed for use in any Forest managed seeding project.

#### Administration and Planning.

- The Forest will develop Coordinated Annual Operating Instructions and/or attendant Memorandums of Understanding (MOUs) with all agencies and county weed boards for the purpose of facilitating cooperation among affected land users and jurisdictions within the BHNF. It is anticipated that these agreements will substantially expand the scope and effectiveness of noxious weed treatment within the Forest.

- The Forest will implement regional direction to establish multi-financing from all Forest management activities to administer and implement the BHNF Weed Management Plan. The Forest will leverage funds where possible with participating counties, states, agencies/organizations, and grants to improve management of noxious weeds across jurisdictional boundaries in the Black Hills region.
- The Forest will develop and incorporate integrated noxious weed plan management guidelines, mitigation and monitoring measures, and consideration of weed issues into Forest planning initiatives and project design of Forest NEPA documents where appropriate. These considerations should focus on incorporating weed species management objectives, prioritizing mitigation by species of concern, and identifying special weed management areas and recommended treatment regimes.

#### Integrated Control.

- The Forest will implement a combination of integrated control strategies to schedule treatment/re-treatment on existing infestation and mitigate and control new weed infestations based on the following treatment priority:
  1. Respond rapidly to new infestations with aggressive treatment with the objective of control or eradication, especially for new or target species invading NFS areas for the first time. Use of herbicides and mechanical treatments are expected to be applied in these situations. Re-treat as needed.
  2. Treat small, scattered existing infestations in NFS habitats at high risk of spread. Use of herbicides and mechanical treatments are expected to be applied in these situations. Re-treat as needed.
  3. Treat or contain larger existing infestations, or infestations having a lower risk of spread. Treatments in these situations are expected to include establishment of insectaries, inoculation of pathogens, and perimeter treatment with herbicides to attain long-term reduction, containment, and control where practical.
    - \* It is expected that specific implementation of the above control priorities will be further defined and clarified in the development of site-specific Cooperative Operating Instructions and Agreements as appropriate.
- Combinations of integrated control methods proposed under the Forest weed plan include: treatment of infested areas with biological agents (including pathogens and insects); herbicide application; and manual/mechanical applications to achieve plan objectives with specific focus on annual treatment/re-treatment on NFS land currently infested or predicted to be infested with noxious weeds within the States of Wyoming and South Dakota to attain net reductions in existing infestations.

Listed below are the major noxious weeds identified for treatment on the BHNF and adjacent federal, state, private lands. The list is consistent with noxious weed species identified as priority weeds to control in Wyoming and South Dakota. The table also indicates Forest priority weeds that pose the highest threat to natural ecosystems on the

BHNF because they are already established on or near the National Forest. This is not an all-inclusive list, such as plants poisonous to livestock, and does not preclude the listing of other species in the future. Moreover, inventories of existing infestation identified in the table only reflect infestations that have been mapped and treated/re-treated over the past 10 years. Many more acres of infestations Forest-wide have been identified by Forest personnel, County agents, local ranchers, and private landowners that have yet to be inventoried and prioritized for treatment.

COMMON NAME	SCIENTIFIC NAME	FOREST PRIORITY	ACRES INVENTORIED
Sulphur Cinquefoil	<i>Potentilla recta</i>	High	3
Canada Thistle	<i>Cirsium arvense</i>	Low	66,976
Leafy Spurge	<i>Euphorbia esula</i>	High	5,854
St. Johnswort	<i>Hypericum perforatum</i>	Medium-High	1,025
Common Mullein	<i>Verbascum thapsus</i>	Low	2,292
Whitetop	<i>Cardia spp.</i>	Low	
Perennial Pepperweed	<i>Lepidium latifolium</i>	Low	
Common Tansy	<i>Tanacetum vulgare</i>	Medium	920
Skeletonleaf Bursage	<i>Ambrosia tomentosa</i>	Low	
Russian Knapweed	<i>Centaurea repens</i>	High	
Yellow Toadflax	<i>Lineria vulgaris</i>	High	402
Dalmation Toadflax	<i>Linaria genistifolia</i>	High	
Scotch Thistle	<i>Onopordum acanthium</i>	Low	
Musk Thistle	<i>Cardus nutans</i>	Low	2,690
Yellow starthistle	<i>Centaurea solstitialis</i>	High	
Plumeless Thistle	<i>Carduus acanthoides</i>	Low	
Dyers Woad	<i>Isatis tinctoria</i>	High	
Houndstongue	<i>Cynoglossum officinale</i>	Medium	948
Spotted Knapweed	<i>Centaurea maculosa</i>	High	634
Purple Loosestrife	<i>Lythrum salicaria L.</i>	High	
Saltcedar	<i>Tamarix ramosissima</i>	High	

#### Operating Procedures.

1. Environmental Protection Agency (EPA) approved herbicides will be applied on a spot treatment basis in accordance with label application procedures and guidelines documented in the following precedent analyses:
  - FEIS for the 1997 Revised Black Hills National Forest Land and Resource Management Plan; Chapter III, pages III-189 through III-199, 1997.
  - FEIS for the Custer National Forest Noxious Weed Management Plan; Chapter III Affected Environment, Pages 19-29, 1986.
  - EA for the Big Horn National Forest Noxious Weed Management Plan; Chapters I, II, and appendices for control operating procedures, 1998.
  - Guidelines for the Coordinated Management of Noxious Weeds for the State of South Dakota, 1992.

- Biology and Management of Noxious Rangeland Weeds; Section II, pages 145-438, 1999.
  - Biological Control of Weeds in the West: Western Society of Weed Science, 1995.
  - Pesticide/herbicide Risk and Use Assessment; USDA Forest Service Forest Health Protection, Washington D.C., Published August, 1998
2. Herbicides will be primarily applied using hand held equipment (hose and handguns). Ground vehicles, backpack sprayers, all terrain vehicles (ATVs), wickets and other equipment developed for spot treatment, are methods also available. Use of spray booms mounted on ground vehicles may be used on a site per site basis where appropriate.
  3. Manual treatments would include hand pulling, grubbing with hand tools or hand cutting.
  4. Mechanical treatments would include mowing, plowing, disking, tilling or burning.
  5. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate.
  6. Integrated control methods to be implemented against target plants. Various noxious weeds respond differently to different control methods.
  7. Use a spot treatment strategy to the extent possible and practical. (As opposed to broadcast application).
  8. Use the lowest application rate recommended for effective control of a given undesirable plant species.
  9. Only herbicides registered for aquatic use may be used in riparian and wetland areas.
  10. No spraying will occur when the wind velocity is high enough to result in off site drift.
  11. Spraying will not occur if air temperatures exceed the herbicide's volatilization point.

#### Inventory/Mapping/Monitoring.

- Under the proposed plan, the Forest will maintain updated noxious weed inventories using appropriate, cost-effective methods. The Forest will design inventories based on evaluation of project risk assessments and priority of integrated control based on the following:
  1. Invasion routes (roads and trails)
  2. Staging areas (e.g. trailheads and campgrounds)
  3. Disturbance areas (timber sales and construction)

Forest mapping will utilize GIS technology in accordance with National Mapping Standards, and annual monitoring evaluations will be utilized with inventories to prioritize treatment.

## Research.

- Coordinate annually with Forest Service Research, the R-2 Regional Noxious Weed Coordinator, and State Cooperative Extension Specialists, State and County Weed Boards and agencies on weed research to improve Forest management efforts.

### ***Mitigation Measures***

The following mitigation measures would eliminate, minimize, or reduce impacts of the Proposed Action. The measures would provide added protection for environmental resources and would be implemented at appropriate stages of the proposed plan to achieve desired results.

1. Guidelines found in Forest Service Manual 2080 and FSH 2209.23, Chpt. 30, and in the Final Environmental Impact Statements (FEIS) will be followed.
2. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas.
3. Domestic animals used to control an undesirable plant species would not be grazed in an infested area during the period of plant seed production and then moved to another vegetative community. This is intended to limit the spread of plant species through animal fecal material.
4. Noxious weed control in the Black Elk Wilderness area will be done in accordance with the Forest Plan (3/97) 1.1A-4301 page III-11.
5. Once undesirable plants are controlled on a site, the area would be seeded with desirable perennial plant species, and/or short-term annuals that are non-persistent, to establish a ground cover and prevent or retard re-establishment of noxious weeds.
6. A pre-treatment cultural resource survey will be conducted on all sites identified for control through methods requiring ground disturbance.
7. In areas where future ground disturbing activities are scheduled to occur within noxious weed infestations, appropriate weed pre-treatment applications will be conducted prior to project implementation to mitigate future spread and establishment of noxious weeds.
8. Pre-treatment surveys and assessments to determine the presence and proximity of resources that may be at risk from weed treatments, including human habitations, aquatic resources, and special status species will be conducted. These assessments will determine the appropriate application strategies prior to project implementation.
9. Pre-treatment surveys will be required anytime control is planned in an area of Federally listed threatened, endangered, proposed or Region 2 sensitive plant species. Control efforts that are least likely to impact, or kill sensitive plant individuals will be used.
10. Inform the public of herbicide control activities where appropriate, areas of high public use will be posted during the time of control and until the foliage is

- completely dry. Signs would include pertinent information. When possible, spray applications would be accomplished when human use is likely to be low.
11. Develop and incorporate a noxious weed management provisions in Forest wildfire recovery plans to mitigate spread and establishment of noxious weeds on Forest areas determined to be at high risk for invasion from wildfire events.
  12. Incorporate requirements for noxious weed management in special use permits for Forest campground concessionaires and vendors.

### ***Monitoring Requirements***

The following measures have been designed to ensure that project activities are completed consistent with design standards and management practices.

1. Key areas treated will be monitored prior to and after treatment to determine effectiveness of control and record the type of method used, level of infestation of target species, and cost.
2. In areas of high undesirable plant densities and acreage, permanent long-term effectiveness monitoring techniques would be implemented. Photo trend studies would be applicable.
3. Monitoring of herbicide use would be completed on an annual and daily basis. Pesticide use reports would be completed at the end of the treatment season (generally in the fall) to record types and amount of herbicides applied. Daily logs would be kept on each ranger district where control activities occur. Daily logs would include information on the type of herbicide, pounds of active ingredient applied per acre, gallons of solution applied, method of application, and location of treatment.
4. Surveys for undesirable plants would be kept on each ranger district showing locations of undesirable plants and where treatment activities have occurred. Surveys would be updated on an annual basis to monitor the effectiveness of control techniques and new infestations. Survey maps would be done on 1:24,000 scales.

## **List of Species Covered in this Document and the Overall Finding for Each Species**

### ***Federal Threatened and Endangered Species***

Threatened, Endangered, and Proposed Species potentially occurring on the Black Hills National Forest were identified through informal consultation with the US Fish and Wildlife Service (USFWS). On April 27, 2001 the USFWS Wyoming State Office provided letter with the current list of endangered, threatened, proposed and candidate species that may occur on the Black Hills National Forest in Wyoming. Frequent informal consultation has also occurred with the USFWS South Dakota State Office. Table 1 lists the Threatened and Endangered Species that may occur on the Black Hills National Forest, based on consultations with USFWS field offices.

**Table 1. Threatened and Endangered Species potentially occurring on the Planning Area.**

Species	Scientific Name	Status	Summary of BA/BE Finding
American Burying Beetle	<i>Nicrophorus americanus</i>	Endangered	May affect, not likely to adversely affect.
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	No effect
Black-footed ferret	<i>Mustela nigripes</i>	Endangered	No effect
Mountain Plover	<i>Charadrius montanus</i>	Proposed	No effect
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened	No effect

### **Forest Service Sensitive Species**

The Forest Service, Region 2, has identified Sensitive plant and animal species. Table 2 lists the Sensitive species that occur on the Black Hills National Forest, and summarizes the findings of this document. Note: An abbreviation “May Impact Individuals...” is substituted for the entire FSM wording of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide”.

**Table 2. Region 2 Sensitive Species on the Black Hills National Forest.**

Species Name	Scientific Name	Summary of BE Finding
American Marten	<i>Martes americana</i>	No impact
Swift Fox	<i>Vulpes velox</i>	No impact
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	No impact
Dwarf Shrew	<i>Sorex nanus</i>	No impact
Fringe-tailed Myotis	<i>Myotis thysanodes pahapensis</i>	No impact
Townsend’s Big-eared Bat	<i>Plecotus townsendii</i>	No impact
Spotted bat	<i>Euderma Maculatum</i>	No impact
Northern Goshawk	<i>Accipiter gentiles</i>	No impact
Olive-sided Flycatcher	<i>Contopus borealis</i>	No impact
Pygmy Nuthatch	<i>Sitta pygmaea</i>	No impact
Black-backed Woodpecker	<i>Picoides arcticus</i>	No impact
Three-toed Woodpecker	<i>Picoides tridactylus</i>	No impact
Lewis’ Woodpecker	<i>Melanerpes lewis</i>	No impact
Golden-crowned Kinglet	<i>Regulus satrapa</i>	No impact
Purple Martin	<i>Progne subis</i>	No impact
Fox Sparrow	<i>Passerilla iliaca</i>	No impact
Merlin	<i>Falco columbarius</i>	No impact
Upland Sandpiper	<i>Bartramia longicauda</i>	No impact
Loggerhead Shrike	<i>Lanius ludovicianus</i>	No impact
Osprey	<i>Pandion haliaetus</i>	No impact
Black Hills Red-bellied Snake	<i>Storeria occipitomaculata pahasapae</i>	No impact
Milk Snake	<i>Lampropeltis triangulum</i>	No impact
Northern Leopard Frog	<i>Rana pipiens</i>	May impact individuals...
Tiger Salamander	<i>Ambystoma tigrinum</i>	May impact individuals...
Tawny Crescent Butterfly	<i>Phycoides batesii</i>	May impact individuals...
Regal Fritillary	<i>Speyeria idalia</i>	May impact individuals...

Species Name	Scientific Name	Summary of BE Finding
Cooper's Rocky Mountain Snail	<i>Oreohelix strigosa cooperi</i>	May impact individuals...
Striate Disc	<i>Discus shimeki</i>	May impact individuals...
American Trailplant	<i>Adenocaulon bicolor</i>	May impact individuals...
Northern Arnica	<i>Arnica lonchophylla</i>	May impact individuals...
Greater Bladder Sedge	<i>Carex intumescens</i>	May impact individuals...
Long-stalk Sedge	<i>Carex pedunculata</i>	May impact individuals...
Treelike Clubmoss	<i>Lycopodium dendroideum</i>	May impact individuals...
Southern Maidenhair Fern	<i>Adiantum capillus-veneris</i>	May impact individuals...
Giant Helleborine	<i>Epipactis gigantea</i>	May impact individuals...
Large Round Leaf Orchid	<i>Platanthera orbiculata</i>	May impact individuals...
Great-spurred Violet	<i>Viola selkirkii</i>	May impact individuals...
Trailing Clubmoss	<i>Lycopodium complanatum</i>	May impact individuals...
Bloodroot	<i>Sanguinaria canadensis</i>	May impact individuals...
Dwarf Scouring Rush	<i>Equisetum scirpoides</i>	May impact individuals...
Marsh Muhly	<i>Muhlenbergia glomerata</i>	May impact individuals...
Fox Tail Sedge	<i>Carex alopecoidea</i>	May impact individuals...
Woolrush	<i>Scirpus cyperinus</i>	May impact individuals...
Autumn Willow	<i>Salix serrisima</i>	May impact individuals...
Autumn Coralroot	<i>Corallorhiza odontorhiza</i>	No determination.
Prairie Moonwort	<i>Botrychium campestre</i>	No determination.

### **Pre-field Review**

Natural Heritage Database Records, ranger district data, literature reviews, survey results from the ranger districts, independent research, layperson reports, and communication with experts served as the basis for determining the inclusion of, and effects upon, sensitive species.

In 2000, a Plant Monitoring Task Team (see end notes) was assembled to develop a monitoring protocol to address Sensitive plant species viability issues identified in the Appeal Decision. Information was compiled on Black Hills sensitive plant species population locations and distribution, the biology and ecology of each species, and viability issues associated with Sensitive plant populations. State and regional authorities were included on the team to re-evaluate the Sensitive plant species list to ensure that all species merited Sensitive species ranking. The re-evaluation of sensitive species ranking for Black Hills National Forest were based upon habitat information and population location information obtained during monitoring and field surveys. Species were evaluated using the same system originally used to designate them as Sensitive. Five of the 18 Sensitive plant species on the Black Hills National Forest have been recommended for removal from the Region 2 Sensitive Species list following the re-ranking process: American trailplant (*Adenocaulon bicolor*), Northern arnica (*Arnica lonchophylla*), Long-stalk sedge (*Carex pedunculata*), Bladder sedge (*Carex intumescens*) and Tree-like clubmoss (*Lycopodium dendroideum*) (Ode in Expert Interview Summary). A monitoring need was identified for the remaining thirteen Sensitive plant species.

## **Field Reconnaissance**

Field reconnaissance has been conducted prior to Forest management activities since 1993, when the Regional Forester issued a sensitive species list for the Rocky Mountain Region. For some species, such as the goshawk, field surveys were being conducted before the Region 2 list. The information gathered from these surveys was used in the Forest Plan BA/BE. Field reconnaissance has continued since the completion of the Revised Forest Plan. Additional field survey data and information primarily collected during project planning continues to be gathered on a variety of threatened, endangered, and sensitive plant and animal species.

Monitoring protocols for sensitive plants, established in response to the Forest Plan appeal decision, were implemented during the 2000 field season. Of the thirteen Sensitive plant species being monitored, two species, *Botrychium campestre* and *Corallorhiza odontorhiza* have very limited historical occurrence information and have not been relocated at previously reported locations to date. Surveys for these species will continue, however, no up-to-date information on their habitats or status in the Black Hills is currently available. Key populations of nine of the eleven remaining species were monitored in 2000 and 2001. The presence of noxious weeds is part of the monitoring strategy for sensitive plant species.

## **Biological Assessment for Threatened and Endangered Species**

The Revised Forest Plan FEIS-Biological Assessment (USDA Forest Service 1996, Appendix H) addressed the following Federally listed species: American burying beetle, bald eagle, peregrine falcon, black-footed ferret, and gray wolf. The peregrine falcon has been de-listed since then, and the gray wolf does not occur on the Forest and there is no indication of emigration into the Black Hills. These two species are not discussed further in this Biological Assessment.

No determination is made for the Canada lynx. Published in the Federal Register on March 24, 2000 was the “Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Related Rule, Final Rule”. In that determination under the heading of *Other Reports or Sightings*, it lists sightings in South Dakota. It also states: “These records are outside of the southern boreal forests where most lynx occurrences are found. We conclude that these unsuitable habitats are unable to sustain lynx and that these records represent dispersing individuals that are lost from the meta-population unless they return to the boreal forest. We do not consider these States to be within the contiguous U.S. range of lynx.”

### ***American Burying Beetle***

The American burying beetle is not likely to occur in the Black Hills because there is no indication that these beetles were associated with western montane forests (USDA Forest Service 1996, Appendix H). Potential habitat likely occurs in the southern Hills where grasslands are adjacent to water and riparian habitats (USDA Forest Service 1996,

Appendix H). The two major threats to this species are the reduction of optimum size prey, especially the young of passenger pigeons (*Ecopistes migratorius*) and greater prairie chickens (*Tympanuchus cupido*); and fragmentation of their natural habitats of Eastern deciduous forests and Midwest prairies (USDA Forest service 1996, Appendix H).

There is no evidence that these beetles ever resided in the Black Hills. American burying beetles have not been found in the Black Hills area. The southern Hills may have some potential habitat, especially along the Cheyenne River bottom, but this area is outside the Forest jurisdiction (other ownership). This beetle was not found in a survey for carrion beetles in the Northern Black Hills (ENSR Consulting and Engineering 1990). Other surveys in western South Dakota have been unsuccessful in collecting the beetle (Marrone 1993, Jameson and Ratcliffe 1991)

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any listed species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. The eventual control of noxious weeds will promote the health of native plant communities and small mammals that depend on them. This will likely benefit the American burying beetle by maintaining conditions to which it has adapted over time. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low likelihood of occurrence on the Black Hills lead to a very low risk to these beetles for both alternatives. Based on this information, it is determined that project may affect the American burying beetle, but is not likely to adversely affect.

### ***Bald Eagle***

Bald eagles are present in the Black Hills during winter, usually arriving in early November. Roosts and feeding areas are important considerations on the wintering grounds (USDA Forest Service 1996, Appendix H). There are no known traditional roosts in the Black Hills, but the ponderosa pine landscape provides the requisite access to potential roost structures. Feeding opportunities occur throughout the Forest, especially along heavily traveled roads due to the availability of deer carcasses (USDA Forest service 1996).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments are not typically done in winter when bald eagles are present in the Black Hills. The treatments are not expected to reduce roosting sites or the availability of carrion (deer carcasses). Based on this information, it is determined that this amendment will not affect the bald eagle.

### ***Black-footed Ferret***

The two threats likely to be most significant are habitat conversion to croplands and prairie dog poisoning (USDA Forest Service 1996). Black-footed ferrets are closely tied to prairie dog colonies. Prairie dogs comprise as much as 90 percent of their diet (U.S. Fish and Wildlife Service 1988). The last direct sighting in the Black Hills occurred in Wind Cave National Park in 1956. The Black Hills National Forest currently has less than 200 acres of prairie dog colonies (USDA Forest service 1996). As part of the reintroduction effort the U.S. Fish and Wildlife Service (1994) estimated desirable prairie dog colony sizes. They concluded that ferrets translocated into suitable habitat (prairie dog colonies 11,700 to 23,500 acre in size) would have a 95 percent chance of persistence for 100 years. Smaller areas (3,700 to 11,700 acres) would require more extensive management to limit mortality. Prairie dog towns occur on the Forest, but these towns are likely too small to support ferrets.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species, including prairie dogs and ferrets. If these species are identified during these surveys, the control options will be evaluated to avoid potential affects. The eventual control of noxious weeds will promote the health of native plant communities and small mammals that depend on them. This will likely benefit the prairie dogs, and possibly ferrets, by maintaining conditions to which they have adapted over time. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low likelihood of occurrence on the Black Hills lead to a very low risk to these ferrets for both alternatives. Based on this information, there will be no effects on black-footed ferrets.

### ***Mountain Plover***

The mountain plover is a medium-sized ground nesting upland bird. Mountain plover prefer large, flat grassland expanses with sparse, short vegetation, and bare ground (Leachman and Osmundson 1990). They breed almost exclusively on the short grass prairie and winter in similar habitats. Plovers usually nest on sites where vegetation is sparse or absent, due to disturbance by herbivores, including domestic livestock and prairie dogs. Positive indicators for mountain plovers include level terrain, prairie dogs, bare ground, cattle, and widely spaced plants. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain; dense, matted vegetation;

grass taller than 4 inches, or wet soils (U.S. Fish and Wildlife Service 2001). In Montana, mountain plovers are rarely seen outside prairie dog colonies (Leachman and Osmundson 1990).

Potential habitat in the Black Hills is likely limited to the larger “interior” prairies, such as Reynolds Prairie, and open areas and shrub steppe landscapes on the fringes of the Forest. The Black Hills National Forest currently has less than 200 acres of prairie dog colonies (USDA Forest service 1996), which may also provide a limited amount of habitat.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species, including prairie dogs. If these species are identified during these surveys, the control options will be evaluated to avoid potential affects. The eventual control of noxious weeds will promote the health of native plant communities and animals that depend on them. This will likely benefit the prairie dogs, and possibly plovers, by maintaining conditions to which they have adapted over time. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low likelihood of occurrence on the Black Hills lead to a very low risk to plovers for both alternatives. Based on this information, there will be no effects on mountain plovers.

### ***Ute ladies'-tresses (Spiranthes diluvialis)***

This plant is currently known from western Nebraska, southeastern Wyoming, north-central Colorado, northeastern and southern Utah, east-central Idaho, southwestern Montana, and central Washington (Fertig 2000a). In Wyoming, the plant is known from the western Great Plains in Converse, Goshen, Laramie, and Niobrara counties. In Nebraska, the orchid has been found along the Niobrara River in Platte County (Intermountain Ecosystems, L.C. 1998). Surveys have taken place in the southwest portion of South Dakota, but to date the orchid has not been found in the state (Ode per. comm. 2001)

*S. diluvialis* is a perennial herb that flowers from early August to early September at the closest populations in Converse and Niobrara Counties, Wyoming (Fertig 2000b). It reproduces by seed. Plants probably do not flower every year and may remain dormant below ground during drought years (Fertig 2000a). In Utah and Colorado, the primary pollinators are bumblebees in the genus *Bombus* (Fertig 2000b). No direct observations of pollination have been made in the state of Wyoming. It is unknown if smaller bees serve as pollinators.

Range-wide, *S. diluvialis* occurs primarily on moist, sub-irrigated or seasonally flooded soils in low gradient valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams. Known sites often have low vegetative cover and may be subjected to periodic disturbances (flooding or grazing). Populations are often dynamic and “move” within a watershed as disturbances create new habitat or succession eliminates old habitat (Fertig 2000a).

In Wyoming, *S. diluvialis* is found mostly on low, flat floodplain terraces or abandoned oxbows within 0.5 to 15 m of a small stream. These sites are sub-irrigated and seasonally flooded, remaining moist into the summer. Soils have a pH between 7.7-7.8. Wyoming populations range in elevation from 4650 to 5420 feet. Populations occur in moist meadow communities within a narrow band between emergent aquatic vegetation and adjacent dry upland prairie (Fertig 2000b). Vegetative cover is typically 75-90% but is usually short (under 45 cm or, 18 inches tall). Plant species that appear to consistently occur with the orchid include white sweet clover (*Melilotis officinalis*), arrow grass (*Triglochin maritimum*), creeping bent grass (*Agrostis stolonifera*) and Baltic rush (*Juncus balticus*) (Hazlett 1996). Average annual precipitation within the range of *Spiranthes diluvialis* in Wyoming varies from 12-16 inches, with peak precipitation coming in May and June. Mean annual temperature ranges from 44-46 degrees F (Fertig 2000b)

This plant is restricted to wet meadows fed by stable groundwater, along meandered wetlands and seeps in low-elevation alkaline valley bottoms, with deep, poorly drained soils. The wetlands are typically inundated early in the growing season, becoming drier but retaining subsurface moisture through the season. The settings are open (short to medium-height graminoids) on terraces or low spots near creek banks (Fertig 1998). Arft and Ranker (1998) note the species occurs between perennial stream channels and adjacent grasslands. The occurrences are restricted to outer margins of wetland habitat that have emergent, often relatively sparse vegetation (Heidel 1997).

Discussions between the Black Hills National Forest and the South Dakota Heritage Program and Wyoming Natural Diversity Database regarding the habitat for *S. diluvialis* and its likelihood of occurrence on lands administered by the Black Hills National Forest have taken place. The most likely areas that this plant could occupy on lands administered by Black Hills National Forest would be along Cascade Creek. Other wetland areas on lands administered by the Forest do not have potential habitat because they have much lower pH's than 7.7, have too steep of a stream gradient, and typically have shrub and tree canopies, and denser and taller vegetation than what appears to be required by *S. diluvialis* (<20"). Floristic inventories and associated species lists compiled from the two parcels of land along Cascade Creek have not documented the presence of *S. diluvialis*. A survey completed specifically for *S. diluvialis* (Hildebrand 1998) covered approximately 25 miles of the Cheyenne River and its tributaries (Moss Agate Creek, Beaver Creek, Pass Creek and Cascade Creek). The majority of the two land parcels are shaded by dense overstories of shrubs and trees and tall riparian vegetation, especially on the J. H. Keith Picnic Ground parcel, and do not provide the shorter vegetation conditions (<20 inches) apparently required by *S. diluvialis*. Recent

plant surveys on adjacent lands along Cascade Creek, owned by The Nature Conservancy, have not documented any occurrences of *S. diluvialis*.

Many introduced species, including noxious weeds, can be aggressive and ultimately displace native species such as *S. diluvialis*. *S. diluvialis* may be susceptible to broadleaf herbicides applied in short grass meadows (Fertig 2000b). Mowing has little impact on vegetative plants. Mowing can be beneficial to *S. diluvialis* populations by reducing competing vegetation cover, if cutting is not too low and is done before the fruit has ripened (Fertig 2000b). It is unknown if mowing has effects on the pollinators, but it could have a detrimental effect (Fertig 2000b).

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species, including *S. diluvialis*. If this species is identified during these surveys, the control options will be evaluated to avoid potential affects. The eventual control of noxious weeds will promote the health of native plant communities that depend on them. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the almost no likelihood of occurrence on the Black Hills lead to an extremely low to no risk to *S. diluvialis* for both alternatives. Based on this information, there will be no effects on *S. diluvialis*.

## ***Biological Evaluation for Sensitive Species***

### ***American Marten***

American marten, a carnivorous mammal about the size of a house cat, were distributed historically throughout coniferous forests of North America (Bennett 1984).

American martens are associated with a narrow range of habitats, generally mesic, late-succession coniferous forests, with large amounts of deadfall, rock outcrops, or other complex near ground structure (Buskirk and Ruggiero 1994). Rocks, low lying branches, fallen logs, stumps, lush forb and shrub vegetation, and subnivean sites provide both thermal and protective cover as well as foraging habitat (Davis 1983, Spencer 1987, Buskirk 1984). Range-wide, martens occupy many habitat types dominated by conifer trees (Allen 1984), but they show preference for areas dominated by spruce, fir, and hemlock species (Buskirk and Ruggiero 1994). Marten generally avoid habitats that lack overhead cover (Buskirk and Ruggiero 1994). Marten stay close to overhead cover, and are intolerant of habitat types lacking at least 30 percent canopy cover (Buskirk and Powell 1994, Clark et al. 1989). A study in California suggested a preference for 40 to 60 percent canopy cover at both resting and foraging sites, and avoidance of stands with less than 30 percent canopy closure (Spencer et al. 1983). Allen (1984) assumed that stands of mature or over-mature coniferous forests, comprised of 40 percent fir or spruce, with a total canopy closure greater than 50 percent, provided near optimal winter habitat. Hargis et al. (1999) found that martens were nearly absent from landscapes having greater than 25 percent non-forest cover. Ponderosa pine is not considered optimum habitat, although there is evidence that martens use pine habitat in the Black Hills (Fredrickson 1981). Range maps in the marten literature do not include the Black Hills, but historical records exist (USDA Forest Service 2000).

Based on recorded observations in the Black Hills marten are generally associated with dense, white spruce dominated forested stands. Because of a ‘re-introduction’ effort by SDGF&P in the 1980’s, and subsequent studies and observation reports this animal has a small, scattered breeding population in the Black Hills that is focused around two separate north and south distribution centers (Spearfish Canyon and Black Elk Wilderness Area).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Establishment of noxious weeds may have a negative impact on prey habitat, but it is unlikely to be significant (USDA Forest Service 2000). Likewise, treatments to reduce noxious weeds will likely have little affect on marten. The eventual control of noxious weeds will promote the health of native plant communities and may benefit small mammals (marten prey) that depend on them. Therefore, there may be some slight

benefits to fauna, including marten, from long-term noxious weed control but it is not likely to be significant.

**Determination:** No impact.

### ***Swift Fox***

The swift fox is a constituent of the Great Plains, associated primarily with moderate to rolling terrain of the short- and mid-grass prairies (Uresk and Sharps 1986, Jones et al. 1983). Prairie dog towns provide the primary food items in the Northern Great Plains (Uresk and Sharps 1986). It is not found in forested habitats.

Potential habitat is limited to the southern portion of the Forest where there are seven prairie dog colonies comprising about 200 acres, the largest of which is 80 acres. The large expanses of open prairies needed by the swift fox occur to some degree in the southern Black Hills, but not to the extent needed to maintain a population (USDA Forest Service 2000). The southern Black Hills, and to some degree the northwest Black Hills, may be suitable transitory habitat for swift foxes moving from one location to another (USDA Forest Service 2000). Prairie dog towns on the Forest are too small to support swift foxes.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species, including prairie dogs. If this species are identified during these surveys, the control options will be evaluated to avoid potential affects. The eventual control of noxious weeds will promote the health of native plant communities and animals that depend on them. This will likely benefit the prairie dogs, and possibly swift fox, by maintaining conditions to which they have adapted over time. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low likelihood of occurrence on the Black Hills lead to a very low risk to swift foxes for both alternatives. Based on this information, no impacts are expected on swift fox.

**Determination:** No impact.

### ***Black-tailed Prairie Dog***

The prairie dog is a diurnal, burrowing rodent, 13-16 inches in length, and weighing up to three pounds (Higgins et al. 2000). It prefers short-grass or mixed-grass prairies (Higgins et al. 2000). This species is a game species regulated by the SDGF&P Department. The prairie dog has been designated a statewide pest since 1984 (SDWPCC) in which control operations may occur. On February 4, 2000 the USF&W Service determined that listing

the black-tailed prairie dog as a threatened species was warranted but precluded by other higher priority actions. It is currently considered a candidate species for listing. While the black-tailed prairie dog currently remains designated as statewide pest in South Dakota, a recent state statute has created a new category for wildlife management (Species of Management Concern) and the process for reclassifying the prairie dog is in progress. The species was added to the R2 (Rocky Mountain) Regional Foresters Sensitive Species List, effective July 1, 2000.

The Black Hills National Forest currently has approximately 200 acres of black-tailed prairie dog 'towns'. There are 4 or 5 small towns, the largest being approximately 80 acres, located in small prairie communities of the southern Black Hills in the vicinity of Edgemont, SD. Wind Cave National Park, south of Custer, SD also has a small prairie dog complex. Current Forest prairie dog conservation activities focus on maintaining the current level of occupied habitat. Recreational shooting can occur at all of these town locations with the exception of Wind Cave National Park. These animals are subject to natural disease and predation. Prairie dog towns have remained stable on the Forest regardless of shooting activities and disease. Poisoning of prairie dogs is not permitted on Black Hills NF lands.

All of the prairie dog towns on the Black Hills National Forest occur within grazing allotments. Black-tailed prairie dogs were found to be more abundant in heavily grazed areas than in ungrazed areas in southwestern South Dakota (Uresk et al. 1982).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed control is not expected to adversely impact prairie dog colonies. Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species, including prairie dogs. If these species are identified during these surveys, the control options will be evaluated to avoid potential affects. The eventual control of noxious weeds will promote the health of native plant communities and animals that depend on them. This may benefit the prairie dogs by maintaining conditions to which they have adapted over time, but it is unknown to what extent the benefits would be. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low occurrence of prairie dogs on the Black Hills lead to a very low risk to prairie dogs for both alternatives. Based on this information, there will be no effects on prairie dogs.

**Determination:** No impact.

## **Dwarf Shrew**

It is unknown whether the Black Hills has a population of dwarf shrews (USDA Forest Service 2000). Three specimens have been collected from prairie habitats around, but not within, the Black Hills (Turner 1974, Higgins et al. 2000). The assumption is that interior prairies are potentially suitable in the Black Hills. In Wyoming this shrew is a rare resident of coniferous forests, aspen, alpine rock outcrops, talus and mountain-foothill shrublands (Oakleaf et al. 1992).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. The eventual control of noxious weeds will promote the health of native plant communities and animals that depend on them. This will likely benefit small mammals by maintaining conditions to which they have adapted over time. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These strategies combined with the low likelihood of occurrence on the Black Hills lead to a very low risk to dwarf shrews for both alternatives. Based on this information, there will be no effects on dwarf shrews.

**Determination:** No impact.

## **Bats**

### **Townsend's Big-eared bat**

### **Fringed Myotis**

### **Spotted bat**

The Townsend's big-eared bat and the fringed myotis both are known to use caves and abandon mines as roost sites. The fringed is also known to use snags, rock outcrops, stumps, and human structures as roost sites (USDA Forest Service 2000, USDA Forest Service 1996 Appendix H). Occasionally Townsend's will also use human structures, snags and rock outcrops as day roosts (USDA Forest Service 2000, Higgins et al. 2000). Abandoned mines may provide a buffer against the loss of natural caves due to private development (USDA Forest Service 2000).

Riparian habitat and water sources are also important features of bat habitat. Open water is important because bats obtain water while flying. Riparian habitats are important for insect production and provide foraging opportunities (USDA Forest Service 2000). Excessive livestock grazing, and degradation of water catchments and ponds reduces the value of this habitat to bats (Pierson et al. 1999).

The spotted bat is not suspected to be present in the Black Hills. Potential habitat may exist in places like Spearfish Canyon but to date these bats have not been recorded any

closer to the Black Hills than Big Horn County, Wyoming (USDA Forest Service 2000, USDA Forest Service 1996 Appendix H). Numerous surveys have been done and no spotted bats have been found, despite the fact that they are easily detected (they are audible to the human ear) and identified (USDA Forest Service 2000).

None of the Alternatives are expected to impact spotted bats. If undiscovered populations exist on the Forest, They are likely to be in inaccessible areas not affected by weed control activities.

The major issues for bats on the Forest are:

- Disturbance inside caves during critical periods from recreational caving,
- Snag densities,
- Closing of abandoned mines that function as bat habitat in place of natural caves,
- Disturbance to cave and mine openings that change the airflow pattern and temperature regime within the caves and mines.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to bats for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives (USDA Forest Service 2000). The eventual control of noxious weeds will promote the health of native plant communities and the animals and insects that depend on them. Based on this information, there will be no effects on sensitive bat species.

**Determination:** No impact.

### ***Northern Goshawk***

The northern goshawk is a raptor that is adapted to forested habitats. In the Black Hills it nests in mature, dense pine, but will occasionally nest in other species like mature

quaking aspen depending on site conditions. Often referred to as a ‘habitat generalist’ the goshawk will prey on a variety of small birds and mammals foraging over a wide range of forest conditions. Critical to goshawk nesting success and long-term survival is the availability of suitable nesting habitat, which is limited to dense or moderately dense stands of large diameter trees, and the availability of prey and the condition of prey habitat. Diverse structural and compositional vegetative conditions are preferred (USDA Forest Service 1996, Appendix H).

The following information is taken from recent interviews of goshawk experts (USDA Forest Service 2000). Prey composition is an integral part of goshawk management. There is limited information on prey use in the Black Hills. Goshawks in the Black Hills likely prey on American robins (*Turdus migratorius*), black-headed grosbeaks (*Pheucticus melanocephalus*), evening grosbeaks (*Coccothraustes vespertinus*), gray jay (*Perisoreus canadensis*), blue jay (*Cyanocitta cristata*), Clark’s nutcracker (*Nucifraga columbiana*), hairy woodpeckers (*Picoides villosus*), long-eared owl (*Asio otus*), mourning dove (*Zenaida macroura*), pinyon jay (*Gymnorhinus cyanocephalus*) in winter, red-naped sapsucker (*Sphyrapicus nuchalis*), and turkey (*Meleagris gallopavo*) polts, as well as those species mentioned in the Forest Plan BA/BE (USDA Forest Service 1996, Appendix H). Flickers, tree squirrels, rabbits, and jays are likely the most important prey species. Tassel-eared squirrels (*Sciurus aberti*), an important prey item in the Southwestern United States, are absent in the Black Hills, but red squirrels (*Tamiasciurus hudsonicus*) likely substitute for them in goshawk diets in the Black Hills. Red squirrels are probably very important prey items, but further research would be necessary to determine if squirrels or other species are critical. Steller’s jays (*Cyanocitta stelleri*) are also an important prey item elsewhere that is absent from the Black Hills. Gray jays may fill in for Steller’s jays in the Black Hills, but they are smaller and less abundant than Steller’s jays usually are elsewhere. Prey species available to goshawks in the Black Hills appear similar to those in the Southwestern United States.

Because no single prey species is likely to be abundant enough to support goshawk populations, habitats for multiple species are necessary (Reynolds et al. 1992). Important habitat attributes include snags, downed logs, woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest vegetative structural stages (Reynolds et al. 1992). Reynolds et al. (1992) recommends 2 snags per acre (greater than 18 inches diameter) and 3 large, downed logs per acre (at least 8 feet long) in ponderosa pine habitats.

The Forest Plan Final EIS BA/BE (USDA Forest Service 1996, Appendix H) identified ponderosa pine structural stages 4C and 5 (i.e., dense mature forests and old growth), at least 25 to 30 acres in size, as likely affording the best nesting habitat for goshawks in the Black Hills. However, goshawks are not restricted to nesting in these stands and could use stands with lower canopy cover as well, such as structural stage 4B (USDA Forest Service 2000). Goshawks exhibit high site fidelity (Reynolds and Joy 1998) and may use lower quality habitat but not produce young (USDA Forest Service 2000). It is important to provide nesting habitat across the landscape, outside of known territories (USDA Forest Service 2000).

There are 144 known goshawk nests on the Black Hills National Forest. Known nest densities are generally higher in the northern and central Hills and become sparse in the southern Hills. The Jasper Fire destroyed 9 nests and altered nesting habitat such that these nests will not likely be used until the forest regenerates to maturity. This is a 6% reduction in nests on the Forest. Another nest was lost in the April 2000 snowstorm. This brings the reduction in nests to about 7 percent. These nests were not active in 2000 before the natural events occurred. One of the nests lost in the Jasper Fire has been known to be active in recent years. These goshawks may try to establish a territory outside the burned area. The potential success of this is unknown due to the limited data on population density in the Black Hills.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to goshawks for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities and may benefit small mammals (potential goshawk prey) that depend on them, but the benefits to goshawks are expected to be minimal. Based on this information, there will be no effects on goshawks.

**Determination:** No impact.

### ***Olive-sided Flycatcher***

Tall, prominent trees and snags or trees with spike tops, which serve as singing and foraging perches, along edges provide foraging (on flying insects) habitat (USDA Forest Service 2000). They prefer tall conifers and mixed woods near edges, clearings, and wooded streams. It forages by hawking flying insects from snags, treetops, and on high exposed limbs and therefore inhabits stands with a low canopy cover percentage (USDA

Forest Service 1996, Appendix H). In South Dakota, this species is an uncommon migrant and possible breeder in the Black Hills (South Dakota Ornithologists' Union 1991).

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to olive-sided flycatchers are expected to be minimal. Based on this information, there will be no effects on Olive-sided flycatchers.

**Determination:** No impact.

### ***Pygmy Nuthatch***

The nuthatch is a weak cavity excavator and tends to select soft, large snags. Snags and old trees over 19 inches DBH are most beneficial (USDA Forest Service 1996, USDA Forest Service 2000). A winter persistence strategy is communal roosting, whereby many individuals use the same roost, which exemplifies the necessity of large diameter snags that provide roost cavities (USDA Forest Service 2000). Clark et al. (1989) recommended 3 to 5 snags per acre in excess of 19 inches DBH.

An uncommon permanent resident in the Black Hills, the pygmy nuthatch seems adapted to various coniferous forest types. Here it is associated with mature, large diameter pine, park-like stands. In Colorado, the bird is more likely to be found in mid-to late-seral, open, park-like stands of ponderosa pine at relatively low elevations (USDA Forest Service 2000).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use

of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to pygmy nuthatches are expected to be minimal. Based on this information, there will be no effects on pygmy nuthatches.

**Determination:** No impact.

## **Woodpeckers**

### **Black-backed Woodpecker**

The black-backed woodpecker is at the southern edge of its range in the Black Hills. The species is rare here, as it is across most of its range in the U.S. (USDA Forest Service 2000). Black-backed woodpeckers in the northern Black Hills have been found in sapling and pole-sized pine with moderate canopy cover, and elsewhere in the Black Hills they have been found in sapling and pole-sized pine with open canopy cover (USDA Forest Service 2000). They have also been seen in two-storied, mature and old ponderosa pine stands that have ponderosa pine regeneration in the understory (USDA Forest Service 2000). Information reviewed in Dixon and Saab (2000) shows nest snags average about 15 inches.

The black-backed woodpecker reaches highest abundance in large areas where insects are prolific such as stand-replacing burns and beetle-killed areas (USDA Forest Service 2000). Fire suppression and post-fire salvage logging adversely affect this species (Dixon and Saab 2000). Agency goals that reduce the chances of large wildfires may have negative consequences for this species (Dixon and Saab 2000). Wisdom et al. (2000) recommends conservation of selected forested stands greater than 387 hectares (956 acres). Wisdom et al. (2000) recommends where post-fire salvage logging occurs, retain snags in clumps rather than evenly spacing, retain greater than 104-123 snags per hectare (42-50 snags per acre) greater than 23 cm (9 inches) in DBH. Wisdom et al. (2000) recommends allowing wildfires to burn in some forests to produce stand-replacing conditions and subsequent beetle outbreaks, and avoiding post-fire salvage logging in portions of large burned forests for five years after the fire.

### **Three-toed Woodpecker**

The following information is taken from recent interviews of woodpecker experts (USDA Forest Service 2000). The three-toed woodpecker is at the southern edge of its range in

the Black Hills. It is seldom reported in the Black Hills, but is most likely to use large stands of mature or old spruce. The three-toed woodpecker is similar to the black-backed woodpecker in that it reaches highest abundance in areas where insects are prolific (i.e., burned and beetle-killed areas). The best conditions are usually provided during the first ten years after a fire or beetle outbreak.

In order to persist on the landscape between these events, the forest matrix must include large stands (hundreds of acres) of old or large trees. These green areas provide suitable nesting and foraging habitat to maintain a low woodpecker density until an outbreak event or fire promotes the species to higher abundance. Pine beetles and other bark beetles are a very important year-round food source, and have a great effect on the woodpecker's abundance, distribution, and long-term viability. Three-toed woodpeckers are a standing-tree bole specialist, and normally use the top third of a tree.

### **Lewis' Woodpecker**

Three principal breeding habitats for the Lewis' woodpecker are open ponderosa pine, open riparian woodlands dominated by cottonwood, and logged or burned pine forests. They also use oak woodland, nut and fruit orchards, and pinyon pine-juniper woodland. An important consideration for winter habitat seems to be available storage sites for food. Cracks in old power poles or mature cottonwood trees may provide such conditions (Tobalski 1997).

The following information is taken from recent interviews of woodpecker experts (USDA Forest Service 2000). Lewis' woodpeckers begin colonizing large burned areas within a year after fire, and become fairly abundant within three to four years. Trees must be damaged, and preferably occur in a mosaic pattern with undamaged trees. An example of this is where pre-fire pockets of dead or dying trees flare up during fire. Good habitat is provided mostly by uncontrolled wildfires, but controlled burns may contribute habitat as well. Pre-fire conditions preferred by Lewis' woodpeckers in Idaho were characterized by moderate (40-70%) canopy closure, 19 inches average tree DBH", and relatively low snag densities (compared to black-backed woodpeckers). Large diameter snags, spike-topped trees, and weakened green trees are all important to the species. Because the bird cannot excavate hard materials, it prefers soft, decayed snags; however, if none are available, pairs may usurp other species from their cavities (e.g., bluebirds, flickers, hairy woodpeckers). Although snags may be essential, their availability alone does not guarantee use by the species.

### **Effects**

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be

followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to woodpeckers for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to woodpeckers are expected to be minimal. Based on this information, there will be no effects on woodpeckers.

**Determination:** No impact.

### ***Golden-crowned Kinglet***

Prime habitat for golden-crowned kinglets is mid- to late-seral spruce with large diameter trees. They tend to nest high in the canopy of dominant trees, and place their nests out on a limb. They may use deciduous forests during winter (USDA Forest Service 2000). This bird is a spruce obligate, and this cover type has a limited distribution (21,681 acres or about 2 percent of the Forest land base) in the Black Hills. Habitat for this kinglet follows the distribution of spruce. Concentrations are located primarily southwest of Lead/Deadwood. White spruce structural stages 4A, 4B, 4C, and 5 are considered high capability summer habitat by the HABCAP model for this species. Currently there are 19,110 acres, representing 1,911 territories (10 acres/pair) available (USDA Forest Service 1996). Under the 1997 Revised Forest Plan the extent of this habitat would be 19,873 acres (1,987 potential territories) after 10 years.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Weed control methods are not expected to reduce spruce habitat for golden-crowned kinglets. Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Biological treatment would

include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to kinglets for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to kinglets are expected to be minimal. Based on this information, there will be no effects on golden-crowned kinglets.

**Determination:** No impact.

### ***Purple Martin***

In South Dakota this species is considered a common summer resident in the east, with a few occurrences during spring migration west to the Black Hills (South Dakota Ornithologists' Union 1991). Otherwise, they are absent from the Black Hills. Suitable habitat is available in the Black Hills as open mature stands of ponderosa pine and the ecotone between forests and grasslands/meadows (USDA Forest Service 1996). Purple martins are absent from apparently suitable environment over its wide range, including the Black Hills; however, biologists are not sure of the reason (Terres 1991).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

**Determination:** Because purple martins occur in the Black Hills only to a limited extent during migrations, no impacts are expected.

### ***Fox Sparrow***

The fox sparrow is associated with riparian areas. It uses fairly dense shrubby areas of mid- to late-succession. Good habitat is often found where streams leave forested habitats and enter meadows (USDA Forest Service 2000). This species is Sensitive to effects of grazing because removal of escape cover or nest camouflage increases its susceptibility to predation (USDA Forest Service 2000).

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide

applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to fox sparrows for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to fox sparrows are expected to be minimal. Based on this information, there will be no effects on fox sparrows.

**Determination:** No impact.

### ***Merlin***

Merlin habitat can be described as where forest meets grassland, or where meadows/open pine forest complexes reach at least 100 acres (USDA Forest Service 2000). Merlins exhibit high site fidelity to their nesting area, and will usually return to same nest year after year (USDA Forest Service 2000). Habitat in the Black Hills may occur on too small a landscape, and if merlins breed there they may occur in low numbers. The Black Hills may be periphery range for the merlin (USDA Forest Service 2000).

The 1997 revised Forest plan includes an objective to restore the grassland (meadow and prairie) communities across the Forest by 10 percent over 1995 conditions. Direction in the 1997 Revised Forest plan to treat tree encroachment into meadows is likely sufficient for maintaining habitat (USDA Forest Service 2000).

Protection of nest sites is also important. Conversions of mature pine along meadow/prairie edges to younger, smaller structure could reduce the amount of suitable nesting habitat.

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Noxious weed treatments will have little effect on merlin nesting habitat. Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides

that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Only herbicides registered for aquatic use will be used in riparian and wetland areas. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to merlins for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities, but the benefits to merlins are expected to be minimal. Based on this information, there will be no effects on merlins.

**Determination:** No impact.

### ***Upland Sandpiper***

In the Black Hills, lower elevation prairies, both interior and at the edge of the Forest boundary, are considered suitable habitat (USDA Forest Service 1996). This sandpiper nests in tall grass and feeds on insects in short grass (USDA Forest Service 2000). Because large expanses of grassland are limited on the Forest, and breeding groups are small and isolated from other populations, the species could be at risk (USDA Forest Service 2000).

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any listed species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. These techniques should minimize chemical treatments on upland sandpiper nests.

Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating

noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to sandpipers for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities and may benefit animals that depend on them, but the benefits to sandpipers are expected to be minimal. Based on this information, there will be no effects on upland sandpipers.

**Determination:** No impact.

### ***Loggerhead Shrike***

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of loggerhead shrike distribution and life history, and is incorporated by reference. Habitat is generally brushy, savannah areas with possibly some tree species. It is not very abundant in forested habitats (USDA Forest Service 2000). The species is not common in the Black Hills and suitable habitat probably occurs where pine trees are encroaching into the larger prairies and some mixed-prairie areas in the southern Black Hills (USDA Forest Service 2000).

Literature suggests shrikes prefer habitats with scattered trees within an open landscape. In the Black Hills, this open landscape design rarely exists. Forested stands that lie adjacent to grasslands/prairies, however, may be suitable for Loggerhead Shrikes. Forest-wide, there are 510,918 acres of suitable habitat. Since grassland/prairie communities would be retained under all alternatives, this figure is not expected to change. Without regard to elevation, the better habitats are found on the southern and western edges of the Forest

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any listed species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. These techniques should minimize chemical treatments on loggerhead shrike nests.

Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given

undesirable plant species would be used. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to loggerhead shrike for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities and may benefit animals that depend on them, but the benefits to loggerhead shrike are expected to be minimal. Based on this information, there will be no effects on loggerhead shrike.

**Determination:** No impact.

### ***Osprey***

Because osprey feed exclusively on fish, they are tied closely to large bodies of water (USDA Forest service 1996, USDA Forest Service 2000). Known nests in the Black Hills are adjacent to reservoirs. One is located in a power-pole adjacent to a reservoir.

Two factors have undoubtedly played a role in the recent osprey range expansion into the Black Hills. First, reservoir construction during the past century created lake habitats, which were naturally absent. Second, game fish have been introduced into the streams and reservoirs. Game fish, especially trout species, added to the forage base for osprey. Without these two changes osprey would not be expected to breed in the Black Hills.

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to osprey for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native

plant communities, but the benefits to osprey are expected to be minimal. Based on this information, there will be no effects on osprey.

**Determination:** No impact.

### ***Black Hills Red-bellied Snake***

The Black Hills subspecies is an isolated population, with the nearest population about 300 miles away near Aberdeen, South Dakota (USDA Forest Service 2000). Little data is available specific to the Black Hills. The northern Black Hills likely provides more habitat than other parts of the Black Hills. These snakes are tied to mesic sites such as wetlands, riparian areas, and wet meadows (USDA Forest Service 2000). Stumps and downed wood are also important. Logs maintain moist conditions and as roots decay, they provide cover (USDA Forest Service 2000). Den sites are often in rocky cracks and crevices (USDA Forest Service 2000).

Snakes are known to be generally resistant to chemicals and affected little by them. Allowing noxious weeds to proliferate would be more detrimental to snake habitat than spraying for noxious weeds (USDA Forest Service 2000).

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to red-bellied snakes for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities and the animals that depend on them, but the benefits to snakes are expected to be minimal. Based on this information, there will be no effects on red-bellied snakes.

**Determination:** No impact.

## ***Milk Snake***

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of milk snake distribution and life history, and is incorporated by reference. The milk snake is generally secretive and hard to find. There is little data to describe abundance in the Black Hills. Habitats include moist sand or gravel (glaciated areas) and rocky canyons in ponderosa pine (USDA Forest Service 2000).

A variety of habitats are used by this species including semiarid to damp coastal bottom land to the Rocky Mountains and tropical hardwood forests, open deciduous woodland, meadows, rocky hillsides, prairies, high plains, sand dunes, farmland and suburban areas (Behler and King 1979). Records are scattered throughout the southern half of the state. Although data is lacking, it is possible that the range extends into the western Black Hills as well. Occurrence information is limited most likely due to the lack of inventories, its secretive nature, and nocturnal habits (USDA Forest Service 2000).

Snakes are known to be generally resistant to chemicals and affected little by them. Allowing noxious weeds to proliferate would be more detrimental to snake habitat than spraying for noxious weeds (USDA Forest Service 2000).

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Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Treatments will occur on a relatively small percentage of the Forest, further limiting the potential effects. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. Biological treatment would include establishment of insectaries for focused release of insects, inoculation with pathogens, or livestock grazing where appropriate. Alternative 1 takes a modest approach to treating noxious weeds and Alternative 2 takes a more aggressive approach. These factors lead to a very low risk to milk snakes for both alternatives.

The effect of noxious weed control activities is expected to be neutral for both alternatives. The eventual control of noxious weeds will promote the health of native plant communities and the animals that depend on them, but the benefits to snakes are expected to be minimal. Based on this information, there will be no effects on milk snakes.

**Determination:** No impact.

## ***Northern Leopard Frog***

Leopard frogs over-winter in permanent water that does not freeze solid. Historically, these frogs were likely most abundant in small ponds and lakes without fish. Loss of beaver ponds has likely reduced the availability of leopard frog breeding habitat. With this loss, frogs have moved from beaver ponds into stock ponds. Water catchments without predatory fish often have numerous frogs. These frogs may have historically occupied streams and associated ponds, but they do not reproduce well in moving water. Historically, before non-native predatory fish were introduced, predation on leopard frogs may have been limited. Leopard frogs can co-exist with predatory fish only if the fish are not abundant, and if shallow water is available (USDA Forest Service 2000).

Wetlands/riparian areas play an essential role throughout the year. Historically, habitat in the Black Hills would have been the abundant riparian beaver dam complexes. The number of beaver dam complexes in the Black Hills has been reduced substantially in the last century (Parrish et al. 1996). Pond habitats seem to be the preferred habitat for leopard frogs. However, a study in Nebraska (Lynch 1978) pointed out the value of riverine habitats as well. They commonly bred in slow moving backwaters, depositing egg masses behind debris or sandbars in swift streams. These conditions occur in Black Hills streams where coarse woody debris, depositional bars, and boulder groups create slackwater in streams.

In relation to weed control, chemically contaminated water is the biggest concern, especially to eggs and juveniles. There is little direct evidence that herbicides affect amphibians. The surfactants in herbicides are highly toxic to aquatic organisms, and most have restrictions about direct application in wetlands (USDA Forest Service 2000).

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Only herbicides registered for aquatic use will be used in riparian and wetland areas. It is assumed that EPA approval of these herbicides have determined that they are not toxic to aquatic organisms. Further, Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives. Individual frogs may be affected if they move away from water and are within the spray area of individual plants or groups of plants. The eventual control of noxious weeds will promote the health of native plant communities and the animals that depend on them, but the benefits to leopard frogs are expected to be minimal.

**Determination:** May adversely impact individual leopard frogs, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### ***Tiger Salamander***

Tiger salamanders are amphibians that inhabit both upland and aquatic habitats during their life cycle. They are found in a variety of situations from sea level to 11,000 feet where the substrate is conducive to burrowing (Gehlbach 1967). This species is found throughout the Black Hills up to about 6,900 feet elevation (USDA Forest Service 1996). As adults, they are restricted to moist microhabitats such as leaf litter and coarse woody material (Cohn 1994). Ponds, springs, reservoirs and slower moving streams were suitable breeding habitat in the Black Hills. Historically in the Black Hills, tiger salamanders and other amphibians probably depended to a large degree on stream habitats and associated beaver dam complexes, and natural springs, because there were no natural lakes (USDA Forest service 1996). Currently, because adults are dependent on mesic conditions, the best habitats in the Black Hills are probably along riparian margins, and upland quaking aspen and white spruce stands.

The following information is taken from recent interview of amphibian experts (USDA Forest Service 2000). Tiger salamanders are frequently found in the same habitats as leopard frogs. Salamander habitat is generally drier and does not always include permanent water. Breeding sites for salamanders include ponds, temporary waters, or any sort of non-flowing system where water is present for six to eight weeks. They seem to require deep water and have been observed using ponds lined with bentonite. It is not likely that they use waters containing predatory fish. Adult tiger salamanders spend most of their lives underground, and emerge infrequently, mainly on wet nights. They do not excavate their own burrows, but instead use passageways of other small mammals. They can often be found in prairie dog towns.

Measures that benefit the leopard frog will likely benefit the tiger salamander as well. Effects are expected to be similar to those of the leopard frog. In relation to weed control, chemically contaminated water is the biggest concern, especially to eggs and juveniles. There is little direct evidence that herbicides affect amphibians. The surfactants in herbicides are highly toxic to aquatic organisms, and most have restrictions about direct application in wetlands (USDA Forest Service 2000).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Only herbicides registered for aquatic use will be used in riparian and wetland areas. It is assumed that EPA approval of these herbicides have determined that they are not toxic to aquatic organisms. Further, Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives. Individual salamanders may be affected if they move away from water and are within the spray area of individual plants or groups of plants. The eventual control of noxious weeds will promote the health of native plant communities and the animals that depend on them, but the benefits to tiger salamanders are expected to be minimal.

**Determination:** May adversely impact individual tiger salamanders, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### ***Tawny Crescent Butterfly***

In South Dakota this butterfly is restricted to the Black Hills region. The disjunct Black Hills population is likely isolated from conspecifics in North Dakota and Nebraska (USDA Forest Service 1996). The tawny crescent tends to be colonial and is typically found in stream bottoms along the transition zone between deciduous and coniferous forests of the Black Hills (Royer and Marrone 1992a). Adults are attracted to exposed moist soils. Adults feed on the nectar of *Aster* spp. and dogbane (*Apocynum spp*), with a preference for *Aster simplex*. Management to conserve habitats should protect the integrity of springs, streams and adjacent habitats (Royer and Marrone 1992a). Specifically, spring and stream flows should be maintained or enhanced to provide requisite moist environments (Moffat and McPhillips 1993).

The tawny crescent butterfly is associated with riparian areas. Black Hills has a disjunct population of the Lakota subspecies, whose main range is in southern Canada. The tawny crescent's preferred habitat (montane, mesic meadows with a conifer component)

has decreased in abundance since the Forest was established. The main causes of this are tree encroachment into meadows, and the resultant decrease in available water (USDA Forest Service 2000).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Negative effects from weed control could occur if herbicides are applied to *Aster* spp. However, large-scale weed infestation, uncontrolled, could reduce the amount of suitable native habitat for the species. The long term result of noxious weed control might be positive, offsetting the short term negative effects, as native species recolonize their niches (USDA Forest Service 2000). In either case, the overall effects, positive and negative, would likely be minor due to the small number of acres actually treated and the focus on treating individual plants or groups of plants. It can be expected that at least some *Aster* spp. will receive incidental hits by herbicides, thereby affecting individual tawny crescent butterflies.

Only herbicides registered for aquatic use will be used in riparian and wetland areas. It is assumed that EPA approval of these herbicides have determined that they are not toxic to aquatic organisms. Further, Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. If these application procedures are followed, they will minimize adverse effects and will not likely cause a trend toward listing or a loss of viability.

**Determination:** May adversely impact individual tawny crescent butterflies, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### ***Regal Fritillary***

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of regal fritillary distribution and life history, and is incorporated by reference. In the Black Hills, the best habitats occur in lower elevation prairies along the outer Forest boundary, and in interior prairies, although tall grass prairies are not predominant in the latter. Two records come from the Black Hills area: Custer State Park in 1946 and Fort Meade Recreation Area in 1985 (Royer and Marrone 1992b). The regal fritillary requires open prairies (Royer and Marrone 1992b). It is a strong disperser among suitable habitats, unless prairie patches are separated by impassable barriers such as forests (Schweitzer 1995). It has been estimated for the Dakotas that at least 1,000 acres

of continuous prairie are required for stable populations. In smaller patches individuals will move in and out depending upon habitat condition (Royer and Marrone 1992b).

The regal fritillary is a strong flyer, so it can travel long distances to areas where populations are not established. As long as grasslands with violets are present, the butterfly could colonize the area. The Black Hills are at the western margin of the butterfly's range, possibly due to increased aridity farther west. The regal fritillary is a grassland species with little naturally occurring habitat in the Black Hills, and because of this, the species may periodically disappear and reappear here (USDA Forest Service 2000).

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Negative effects from weed control could occur if herbicides are applied to violets. However, large-scale weed infestation, uncontrolled, could reduce the amount of suitable native habitat for the species. The long term result of noxious weed control might be positive, offsetting the short term negative effects, as native species recolonize their niches (USDA Forest Service 2000). In either case, the overall effects, positive and negative, would likely be minor due to the small number of acres actually treated and the focus on treating individual plants or groups of plants. It can be expected that at least some violets will receive incidental hits by herbicides, thereby affecting individual regal fritillaries.

Only herbicides registered for aquatic use will be used in riparian and wetland areas. It is assumed that EPA approval of these herbicides have determined that they are not toxic to aquatic organisms. Further, Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. If these application procedures are followed, they will minimize adverse effects and will not likely cause a trend toward listing or a loss of viability.

**Determination:** May adversely impact individual regal fritillaries, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

## **Snails**

### **Cooper's Rocky Mountain Snail Striate Disc**

The following information comes from the work of Frest and Johannes (1993) in the Black Hills. Habitat consists of calcareous soils developed on the Pahasapa Limestone, but also the Ordovician Whitewood Formation in lower Spearfish Canyon. They were not found in the gypsum or anhydrite-bearing outcrops (Minnelusa Formation and Minnekahta Limestone) even though these are calcareous derived.

Most sites were lowland wooded areas and talus slopes, generally but not always, north- or east-facing slopes. Most colonies were found in partially closed-canopied ponderosa pine stands with a secondary deciduous component and a diverse understory. White spruce was common at some sites. Riparian woodland colonies were often adjacent to steep, rocky slopes.

In relation to other land snails, *Oreohelix* can thrive with little cover and thin litter. Floodplains above the normal high water mark are excellent habitat. This and other congeners tend to avoid moist areas. Forage consists of partially decayed deciduous leaves and degraded herbaceous material. Under suitable circumstances, it is found on downed wood, tree trunks (up to 28" high) and limestone talus.

The striate disc is often found on relatively undisturbed forested sites with minor insolation, grazing, and logging pressure. None of the sites were immediately adjacent to roads. As with the Cooper's Rocky Mountain Snail, colonies appear to be negatively impacted by road construction, grazing, logging, herbicides, pesticides, and major forest fires. No colonies were located in areas heavily grazed or completely logged. Mining can affect snails either through the clearing of vegetation or via toxic leachates. Conversions of white spruce to ponderosa pine would reduce the natural boreal diversity and adversely affect this snail.

The following information is taken from recent expert interviews (USDA Forest Service 2000). These snails are found in mesic environments, next to riparian communities, on calcareous soils and north-facing slopes. They are associated with mesic forest floors because they cannot effectively regulate body fluids, and are susceptible to desiccation. There is a lot of uncertainty surrounding these land snails. There is considerable habitat in the Northern Hills that appears to be suitable for striate disc, but no colonies are present. The striate disc is fairly widely distributed in the western U.S., and the Black Hills populations are at the northeast edge of its range. The Black Hills population is the only one to overlap with the fossil record, indicating a shift towards the West. McDonald felt that the Rocky Mountain snail is endemic to the Black Hills and Forest management activities could have a more significant impact on this species.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

In the Forest Plan, as amended, Standard 3103 directs us to ensure that all known colonies of snails ‘of special concern’ are protected from adverse effects of livestock use and other management. The word “protected” generally infers that the area would be deferred from timber harvest and/or fenced from livestock grazing, recreation, or other activities. Colonies would be protected such that activities would not occur on those sites. Known colonies include all the colonies identified in the Frest and Johannes 1993 report and the subsequent report expected in 2001.

If any sensitive species are identified during surveys, the control options will be limited, in most cases, to manual control techniques. If this measure is applied to the known snail colonies per Standard 3103 in the Forest Plan, adverse effects should be minimal for these snails. Unknown colonies may still be affected, but the overall population would be maintained.

**Determination:** May adversely impact individual Sensitive snails, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

## **Plants**

Noxious weed invasions are considered to pose a serious risk for most of the sensitive plant species addressed, particularly for those found in riparian areas and wetlands due to the concentration of a variety of management activities and uses that occur in these habitats (USDA Forest Service 2000).

Species' distributions and natural histories presented here include only the details and/or new information relevant to the evaluation of the effects of the noxious weed management alternatives on Black Hills' Sensitive plant species. See the 1997 Revised Forest Plan FEIS Appendix H, along with Appendix G to the 2001 Phase I Amendment to the Revised Forest Plan for additional species information and references.

### ***Adenocaulon bicolor* (American Trailplant)**

### ***Arnica lonchophylla* (Northern Arnica)**

### ***Carex intumescens* (Greater Bladder Sedge)**

### ***Carex pedunculata* (Long-stalk Sedge)**

### ***Lycopodium dendroideum* (Tree-like Clubmoss)**

Due to more abundant and widespread distributions than previously believed, and that populations occur within Forest Designated Botanical Areas and/or the Black Elk Wilderness (populations receive limited effects from management activities), the five species listed above have been determined to no longer merit status on the Region 2 Sensitive Species list by state and regional authorities (Black Hills Sensitive Plant Task Team 2000, Revised LRMP Phase I Amendment 2001). For this reason, the scientific experts did not address these species in the Expert Interviews (USDA Forest Service 2000), and the effects of the Selected Alternative on them are not evaluated here.

### ***Determinations***

Based upon the above rationale that these five species no longer merit status on the Region 2 Sensitive species list, for the proposed alternative, a determination of "May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability range-wide" is made for: *Adenocaulon bicolor* (American Trailplant), *Arnica lonchophylla* (Northern Arnica), *Carex intumescens* (Greater Bladder Sedge), *Carex pedunculata* (Long-stalk Sedge), and *Lycopodium dendroideum* (Tree-like Clubmoss).

## ***Adiantum capillus-veneris* (Southern Maidenhair Fern)**

Southern maidenhair fern is closely tied to warm, calcareous waters throughout the northern part of its range, wherein the Black Hills population is disjunct and isolated from occurrences in Colorado, Canada and its more southerly distribution (USDA Forest Service 2000). The population of southern maidenhair fern at the warm water springs of Cascade Springs (administered by the Forest Service) and south along Cascade Creek (on private land and on land belonging to The Nature Conservancy) to Cascade Falls (administered by the Forest Service) has been known for 100 years, since Bessey's observation in the late 1800s.

In the northern portion of its range, this species requires the climate moderating effect of a constant flow of warm water, as is found at Cascade Springs and along Cascade Creek, which serves to provide enough warmth to prevent lethal freezing of the plants during winter months. For this reason, the species is unlikely to occupy additional habitats in the Black Hills.

Because southern maidenhair fern's local and regional distribution coincides with *Epipactis gigantea*, the effects of the management of noxious weeds on these two species and evaluation of the selected alternative are evaluated together, below.

## ***Epipactis gigantea* (Stream Orchid, Giant Helleborine)**

The species' distribution in the Black Hills is limited to Cascade Springs and portions of Cascade Creek on adjacent private and Nature Conservancy (TNC) property. Monitoring conducted in June 2000 revealed that the population at the 10-acre Cascade Springs site is larger and more widely distributed than previous reports indicated. Stream orchid is strongly associated with the distribution of *Adiantum capillus-veneris* at the site. The earliest record of *Epipactis gigantea* at Cascade Springs is from 1929. At present, stream orchid occupies nearly all-suitable habitats at J. H. Keith Cascade Springs Memorial Park.

The species is an obligate colonizer that apparently prefers the open, early successional flood bench habitats along the creek and other moist, open areas associated with the springs, creek side slopes and sedge meadows at Cascade Springs. The continuous flow of spring water at a constant, year-round temperature moderates the climate in and around Cascade Springs: a quality essential to the survival of *E. gigantea* in this portion of its range, where it is rarely found far from an immediate warm or hot spring area (Mantas 1993).

### **The Effect of Noxious Weeds, and Their Management on *Adiantum capillus-veneris* and *Epipactis gigantea***

*A. capillus-veneris* and *E. gigantea* occur at Cascade Springs and *A. capillus-veneris* at Cascade Falls, both developed recreation areas (Management Area 8.2). The constant

warm water flow from Cascade Springs is essential to the occurrence of both species in the Black Hills, but the springs apparently not affected by local surface modifications, due to its deep source that originates in Hell Canyon. Beyond any hydrologic modification, ongoing recreational use and noxious weed invasion are likely the most significant threats to these species. Both species are located along the water's edge, where weeds and weed control are of concern.

Noxious weed invasion at Cascade Springs and along Cascade Creek are of immediate concern and the need for language addressing integrated pest management within existing noxious weed Standards were identified by scientific experts (USDA Forest Service 2000). Sensitive plant populations are at risk from *Eleagnus angustifolia* (Russian olive) and *Cirsium arvense* (Canada thistle) at both sites, and by *Tamarix ramosissima* (salt cedar) at Cascade Falls, and these weedy invaders could potentially overgrow the streamside habitats if not actively suppressed or removed. Periodic disturbance of the riparian canopy and/or removal of invasive species may be required to maintain existing habitats and to provide sites for colonization by *E. gigantea* and *A. capillus-veneris*. Although not yet documented at Cascade Springs, the aquatic invader purple loosestrife (*Lythrum salicaria*) occurs in the Black Hills and should be considered a serious risk to the health and viability of these southern maidenhair fern and streamside orchid, and their habitats at Cascade Springs and Cascade Falls. It is not clear how weed control activities may affect these species, and the aggressive herbicide treatments required for noxious weed species like leafy spurge would likely be detrimental (USDA Forest Service 2000).

The Nature Conservancy (TNC) owns a large portion of the land surrounding the Cascade Creek drainage between both of the BHNF administered sites where the species occurs: J. H. Keith Cascade Springs Memorial Park and J. H. Keith Cascade Falls. This land contains occurrences of both *E. gigantea* and *A. capillus-veneris*. A cooperative weed management program was implemented in 2000 by the Forest Service and TNC in the Cascade Valley.

Only herbicides registered for aquatic use will be used in riparian and wetland areas. It is assumed that EPA approval of these herbicides have determined that they are not toxic to aquatic organisms. Further, noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones along riparian areas. The lowest application rate recommended for effective control of a given undesirable plant species would be used. If these application procedures are followed, they will minimize adverse effects and will not likely cause a trend toward listing or a loss of viability.

Cumulative effects on the species populations and habitats from noxious weed infestation are expected to continue at both sites administered by the Forest Service due to the requirement for public recreation access and the susceptibility of riparian habitats to

noxious weed invasion. Noxious weed infestations may also occur on adjacent private lands, but treatment levels of private land weed infestations are unknown. Because both southern maidenhair fern and stream orchid occur almost entirely on NFS administered lands or TNC lands, management of noxious weeds will continue to occur. Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

**Determination:** May adversely impact individuals of *Adiantum capillus-veneris* and *Epipactis gigantea*, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### **Platanthera orbiculata (Large Round-leaf Orchid)**

This orchid is a North American endemic that is distributed from Newfoundland to southern Alaska, south to Tennessee, Minnesota and Oregon (Great Plains Flora Association 1986). The species is disjunctly distributed in remnant boreal/hardwood forests in the Black Hills of South Dakota and Wyoming. Baseline survey monitoring of Black Hills' occurrences was conducted in 2000, and monitoring of key populations occurred during the 2001 field season. Occurrences are on the northwestern limestone plateau of the Black Hills, three in the Bearlodge Mountains of Wyoming, and three in the Black Elk Wilderness Area.

*Platanthera orbiculata* is a terrestrial orchid that apparently only reproduces by seed and, like most orchids, is a mycorrhizal obligate that requires a fungal associate in order for germination to occur. The specific pollinators have not been identified, however it is suspected to be moth pollinated (Van Der Pijl and Dodson 1966). In the Black Hills, *P. orbiculata* occurs from 4300 to 6000 feet in elevation in isolated, shady, north-facing slopes or draw bottoms in association with paper birch-hazelnut, or mixed hardwood-spruce forests and a species-rich understory on humus soil.

The species is currently closely associated with mid-successional spruce/birch boreal habitats in the northern Black Hills and Bearlodge Mountains. Noxious weed introductions into the species' habitat can include dispersal via roads, machinery, various types of recreation, wind dispersal, livestock and/or wildlife, and poses a considerable risk to the species. Noxious weed introduction to the *P. orbiculata* sites in the Black Elk Wilderness could potentially occur through hikers carrying weed seed on clothes or shoes, by recreational horses or through wind dispersal (Canada thistle). During survey and monitoring of *P. orbiculata* sites in 2000 and 2001 (BHNF LRMP Phase I Amendment Appendix F), the locations Canada thistle (*Cirsium arvense*) at several *P. orbiculata* sites was of concern, however, the methods with which weed infestations are treated is also an issue. Although little is known about the pollinators of *Platanthera* sp., *P. orbiculata* appears to be pollinator specific. Impacts to, or loss of, *P. orbiculata* individuals and/or the species' pollinators in the Black Hills due to weed control treatments could significantly pose a risk to the species' persistence in the Black Hills.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives.

**Determination:** May adversely impact individuals of *Platanthera orbiculata*, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### ***Viola selkirkii* (Selkirk's Violet)**

*Viola selkirkii* is a circumboreal species, distributed south to Pennsylvania, Minnesota and British Columbia with disjunct populations in South Dakota and Colorado (Gleason and Cronquist 1991). Known occurrences in the Black Hills are in the Sylvan Lake area of Custer State Park, the Black Elk Wilderness and the Norbeck Wildlife Preserve, and an unverified report (appears to be on private land) from Deer Mountain, Lawrence County, SD (Larson 1993; Marriott 2001).

In the Black Hills, *V. selkirkii* is found on moist, mossy benches or rocky slopes in cool, shady ravines at elevations of 5400 to 7000 feet (Marriott 2001). Known locations on lands administered by the Forest Service occur within the granitic core of the Black Hills, where soils derived from granitic parent material are suspected to be a requirement for the species (Larson and Johnson 1999). *V. selkirkii* occurs in spruce forests in cold air drainages often associated with rock cliffs (USDA Forest Service 2000), where it is commonly found in association with rotting logs and stumps, or on moss mats on rock outcrops (Marriott 2001). The species reproduces vegetatively by long, narrow rhizomes, and sexually either through cross-pollination of its conspicuous flowers or self-

pollination of reduced, apetalous flowers (Russell 1965). The seeds are ant dispersed (Russell 1965; Larson and Johnson 1999).

Survey of *Viola selkirkii* occurrences in the Black Elk Wilderness and Norbeck Wildlife Preserve, and data collected on the key population for monitoring within the Norbeck Wildlife Preserve has not revealed the occurrence of noxious weeds. Noxious weed invasion is expected to be limited at many of the sites within the Wilderness or the Preserve. Rock-climbing is an on-going activity that will likely continue and increase in Custer State Park and on Forest Service administered lands due to increasing recreational use of the Black Hills' Central Core. The effects of rock climbing could include the introduction of noxious weeds by climbers carrying seeds on clothing, shoes and gear. Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed, and because of the limited risk of noxious weed invasion into *V. selkirkii* habitat and the limited amount of noxious weeds at occurrence sites, the effect of noxious weed control activities is expected to be neutral for both alternatives on existing populations of *V. selkirkii* on BHNF administered lands.

**Determination:** May adversely impact individuals of *Viola selkirkii*, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

### **Lycopodium complanatum (*Trailing Clubmoss*)**

Trailing clubmoss is a boreal remnant species that occurs in cool, shady spruce or birch habitats, often on steep, north-facing slopes (USDA Forest Service 2000). The species' disjunct occurrence in the northern Black Hills is considerably south of its normal range (Flora of North America 1993). There are four occurrences within the Hills with one population on land administered by the Black Hills National Forest in the Upper Sand

Creek Botanical Area. Resurvey and monitoring (BHNF LRMP Phase I Amendment Appendix F) of the site was conducted in 2000 and 2001.

The species' habitat in Upper Sand Creek Botanical Area suggests an upland or facultative upland habitat is preferred by the species. At the BHNF location, *L. complanatum* is currently associated with *Betula papyrifera*, *Cornus canadensis*, *Corylus cornuta*, *Linna borealis*, *Lycopodium annotinum*, *Picea glauca*, *Pinus ponderosa*, *Vaccinium scoparium*, and *Vaccinium membranaceum* in dense cover of mosses.

During the 2000 resurvey and 2001 monitoring of the *L. complanatum* (USDA 2001 Appendix F), no weeds were found in the specific area covered by *L. complanatum*, therefore there are no current effects to the species from noxious weeds. A variety of noxious weeds and invasive species are located approximately 100 meters down slope and downstream from the *L. complanatum* site administered by the Forest Service. The list of weeds includes *Tanacetum vulgare* (Common tansy), *Carduus nutans* (Musk thistle), *Cynoglossum officinale* (Houndstongue) and *Hypericum perforatum* (Common St. Johnswort). The weeds grow along the stream in association with a different set of overstory species, and under a more open canopy condition than what is found upslope where *L. complanatum* is located. Effects from noxious weeds or their treatment is unknown for this species, however it is likely that some effects could be realized from noxious weeds and their treatment if they were to invade the *L. complanatum* site. It is currently unknown if there are noxious weeds at the *L. complanatum* sites not administered by the Forest.

Refer to Appendix H of the 1997 Revised Black Hills National Forest Land and Resource Management Plan Final Environmental Impact Statement, and Appendix G of the Phase I Amendment to the Plan for additional discussion of cumulative effects on this species.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives on existing populations of *L. complanatum* on BHNF administered lands.

**Determination:** May adversely impact individuals of *Lycopodium complanatum*, but is not likely to result in a loss of viability on the planning area, nor cause a trend towards federal listing or a loss of species viability range-wide.

## **Sanguinaria canadensis (Bloodroot)**

*Sanguinaria canadensis*' distribution in the Black Hills is disjunct from the eastern deciduous forest, with the closest occurrences in eastern SD, NE and KS. In the Black Hills, bloodroot occurs at low- to mid-elevations in the north-to-north east portions of the Forest, primarily associated with (*Quercus macrocarpa*), ironwood (*Ostrya virginiana*), hazelnut (*Corylus cornuta*) and birch (*Betula papyrifera*) (Larson and Johnson 1999). Some of the bloodroot populations occur in areas associated with beaver use.

The species is a shallow-rooted, spring ephemeral that inhabits rich deciduous forest soils (USDA Forest Service 2000). It may receive pollen via a pollinator for only a very short period of time after the flower opens, otherwise it self-pollinates. The seeds are ant dispersed. Because bloodroot's habitats in the northern Hills are very unusual compared to the species' eastern associations, its ecological requirements in the Black Hills are not well understood.

Noxious weeds and other invasive species have been documented at some of the *S. canadensis* sites. The species' hardwood habitats immediately adjacent to riparian areas are vulnerable to weed invasion (USDA Forest Service 2000). Noxious weeds appear to pose the most serious risk to bloodroot, both from invasion and treatment. Weeds documented during survey and monitoring of some of the known locations have included *Cynoglossum officinale* (houndstongue), *Cirsium arvense* (Canada thistle), *Centaurea maculosa* (spotted knapweed), *Linaria genistifolia* ssp. *dalmatica* (dalmatian toadflax), and *Tanacetum vulgare* (Common tansy). Some of the weeds, such as Canada thistle could foreseeably out-compete bloodroot and chemical treatment of the weed could be detrimental to bloodroot (USDA Forest Service 2000).

The impacts to bloodroot from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. Noxious weeds at bloodroot sites become high priority for control efforts. Areas of noxious weeds adjacent to *S. canadensis* are to be treated, or in the case of common tansy, need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *S. canadensis* individuals will be used. Wicking weeds at key/core population sites (USDA Forest Service 2001, Appendix F) could be effective.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives on existing populations of *V. selkirkii* on BHNF administered lands.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *Sanguinaria canadensis*.

## **Equisetum scirpoides (Dwarf Scouring Rush)**

As with many other R2 Sensitive Plants in the Black Hills, *Equisetum scirpoides* is a disjunct boreal remnant species. *E. scirpoides* occurs in Pennington and Lawrence Counties, SD and Crook County, WY. Many sites occur within Botanical Areas (i.e. Upper Sand Creek, Bear/Beaver Gulches, Higgins Gulch). *E. scirpoides* typically occurs in cool, moist, shaded streamside slopes and terraces in spruce/birch/hazelnut forest (USDA Forest Service 2000). It occupies riparian habitats that are often dynamic, but the species is presumed to be adapted to flooding and scouring and persist after the disturbance (USDA Forest Service 2000). Documentation from the sites listed above, reveals that this species occurs on a variety of geological types, over a range of elevation, along drainages with varying aspects, and in a number of different watersheds on the Forest. The species reproduces either by aerially borne spores or vegetatively through deep-rooted rhizomes and rhizome fragments. New information on the abundance and habitat preferences of the species is currently being re-evaluated as to whether it continues to merit status as R2 Sensitive. In addition, a large proportion of the riparian areas (approx. 50%) in the Black Hills are under private ownership and likely have additional populations of *E. scirpoides*.

A primary risk identified for this species could be the invasion of purple loosestrife (*Lythrum salicaria*) into the *E. scirpoides* sites that are located within riparian areas. Purple loosestrife is not currently known to occur at any of the sites that were monitored in 2000 and 2001, or anywhere close by, but if it invades any of the areas, it is very

aggressive and has the potential to impact *E. scirpoides*. Various weed control methods could also pose a risk to *E. scirpoides* (USDA Forest Service 2000).

The impacts to *E. scirpoides* from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. An invasion of purple loosestrife at dwarf scouring rush sites becomes high priority for control efforts. Areas of purple loosestrife in and adjacent to *E. scirpoides* are to be treated, or need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *E. scirpoides* individuals are to be used.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed, the effect of noxious weed control activities is expected to be neutral for both alternatives on existing populations of *E. scirpoides* on BHNF administered lands.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *Equisetum scirpoides*.

### **Muhlenbergia glomerata (Marsh or Bristly Muhly)**

The species is widely described as being a facultative wetland species (Fertig 1993). Only the McIntosh Fen site is truly mesic. A number of new population sites of this species have been located in the last few years. The majority of newer sites in the Black Hills are found in upland habitats that are less mesic than the species habitats previously described in literature (boggy wetland and riparian areas), but many of the sites are commonly found in or immediately upland from riparian meadows. Habitats ranged from the open, grassy wetland meadow at McIntosh fen to pine and spruce dominated open forest, usually with a hardwood component; ledges and slopes along creeks; and open, grassy

hardwood draw bottoms. Existing perceptions about the species in the Black Hills, as well as being R2 Sensitive is changing (USDA Forest Service 2000). Two locations of *M. glomerata* are included in designated Botanical Areas (McIntosh Fen and Bear/Beaver Gulches) and there are sites within Spearfish Canyon. More sites found in 2001 are in upland areas that are not adjacent to riparian areas or wetlands. The 2001 sites have included *M. glomerata* located in bur oak, in an opening that had been used for fire suppression within an area of ponderosa pine, and in an area recently burned (within the Jasper Fire perimeter) and dominated by aspen. New information on the abundance and habitat preferences of the species is currently being re-evaluated as to whether it continues to merit status as R2 Sensitive. It is expected that the new habitat information from the Black Hills will be published within the coming year.

A primary risk identified for this species could be the invasion of purple loosestrife into the sites that are located within riparian areas (such as at McIntosh Fen). Purple loosestrife is not currently known to occur at any of the *M. glomerata* sites, or anywhere close by, but if it invades any of the areas, it is very aggressive and has the potential to impact the species at wetland sites. Because of the primary risk to the species being purple loosestrife invasion, part of the current monitoring design for this species (USDA Forest Service 2001, Appendix F) is to document if purple loosestrife occurs at any of the key monitoring locations. Purple loosestrife at any of the key monitoring sites will serve as a “trigger” to check other known populations for this noxious weed. Active treatment measures are to be taken if purple loosestrife is located.

A large proportion of the Black Hills is under private ownership and other lands administered by agencies other than the Black Hills National Forest. It is expected that *M. glomerata* occurs on these lands, but it is unknown as to what habitats the species may be occurring in or what impacts weeds or weed treatments may be having on those populations.

The impacts to *M. glomerata* from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. ). An invasion of purple loosestrife at *M. glomerata* sites becomes high priority for control

efforts. Areas of purple loosestrife in and adjacent to *M. glomerata* are to be treated, or need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *M. glomerata* individuals are to be used.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *M. glomerata*.

## **Carex alopecoidea (Fox-tail Sedge)**

*Carex alopecoidea* occurs from Quebec and Maine to Manitoba, south to New Jersey, Indiana, and Iowa, and west to North Dakota, South Dakota, and Wyoming (Great Plains Flora Assoc. 1986; Gleason and Cronquist 1991; Fertig 1994). In the Black Hills, this species’ known distribution up until 2001 was limited to the Upper Sand Creek/Spotted Tail Gulch drainages and Dugout Gulch Botanical Area in the Bearlodge District in Crook County, Wyoming (Ode and Marriott 1990; Zacharkevics, personal communication Dec. 20, 2000). During the current 2001 field season, sites were surveyed to confirm some mapped areas where this species was thought to occur. Confirmed populations of *C. alopecoidea* occur at many of the sites. Herbarium vouchers have been collected at a number of other sites in the northwestern Black Hills and Bearlodge Mountains and will be sent in for confirmation this fall.

In the Black Hills, the species is known to occur from 3800 to 6000 feet elevation in saturated meadows and willow-sedge communities along streams (Ode and Marriott 1990; Marriott 1991b; Zacharkevics personal communication Dec. 20, 2000). *C. alopecoidea* is suspected to be a disturbance-dependent species due to its patchy distribution in apparently good habitats; however, its habitat preferences are not well understood at this time (USDA Forest Service 2000). It appears to be associated with old beaver dams where flooding and disturbance have created wet meadow habitats. Historic mining activity is also suspected to play a role in its current distribution in the Hills, wherein soil disturbance from placer mining in the late 1800’s and 1900’s in Spotted Tail Gulch may have created additional habitats for the species.

As with other R2 Sensitive plant species, a primary risk identified for this species could be the invasion of purple loosestrife into the sites that are located within riparian areas. Purple loostrife is not currently known to occur at any of the *C. alopecoidea* sites, or anywhere close by, but if it invades any of the areas, it is very aggressive and has the potential to impact the species at wetland sites. Because of the primary risk to the species being purple loosestrife invasion, monitoring should document if purple loosestrife occurs at monitoring locations. Active treatment measures are to be taken if purple loosestrife is located.

A large proportion of the Black Hills is under private ownership and other lands administered by agencies other than the Black Hills National Forest. It is expected that *C. alopecoidea* occurs on these lands, but it is unknown as to what habitats the species may be occurring in or what impacts weeds or weed treatments may be having on those populations.

The impacts to *C. alopecoidea* from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. An invasion of purple loosestrife at *C. alopecoidea* sites becomes high priority for control efforts. Areas of purple loosestrife in and adjacent to *C. alopecoidea* are to be treated, or need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *C. alopecoidea* individuals are to be used.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *C. alopecoidea*.

## **Scirpus cyperinus (Woolgrass)**

Baseline survey of *Scirpus cyperinus* populations was conducted on the Bearlodge District during the 2000 field season. Monitoring of key populations occurred during the 2001 field season. Populations elsewhere in the Black Hills are no longer tracked by the state due to its abundance on the South Dakota portion of BHNF and the majority of sites within the Norbeck Wildlife Preserve and Black Elk Wilderness. The Wyoming Natural Diversity Database is also re-examining whether the species merits Sensitive status due the number of occurrences that have been documented recently (bringing the total to 45 occurrences, as of 2000, of *S. cyperinus* located on FS administered lands in the Bearlodge Mountains).

Woolgrass is a wetland species found on creek margins and is emergent at the upstream end of beaver dams, usually associated with willow and an open canopy (USDA Forest Service 2000). Most of the 45 sites visited during the 2000 baseline survey effort were associated with beaver dams, active and abandoned, where the plant usually occurred at pond margins and often on top of the dams.

As with other R2 Sensitive plant species, a primary risk identified for this species could be the invasion of purple loosestrife into the sites that are located within riparian areas. Purple loosestrife is not currently known to occur at any of the *S. cyperinus* sites, or anywhere close by, but if it invades any of the areas, it is very aggressive and has the potential to impact the species at wetland sites. Because of the primary risk to the species being purple loosestrife invasion, monitoring should document if purple loosestrife occurs at key monitoring locations. Purple loosestrife at any key monitoring site, will serve as a “trigger” to check other *S. cyperinus* locations for purple loosestrife. Active treatment measures are to be taken if purple loosestrife is located.

A large proportion of the Black Hills is under private ownership and other lands administered by agencies other than the Black Hills National Forest. It is expected that *S. cyperinus* occurs on these lands, but it is unknown as to what habitats the species may be occurring in or what impacts weeds or weed treatments may be having on those populations.

The impacts to *S. cyperinus* from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. An invasion of purple loosestrife at *S. cyperinus* sites becomes high priority for control efforts. Areas of purple loosestrife in and adjacent to *S. cyperinus* are to be treated, or need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *S. cyperinus* individuals are to be used.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *S. cyperinus*.

## ***Salix serissima* (Autumn Willow)**

*Salix serissima* is a disjunct relic in the Black Hills that occurs primarily in northern boreal bogs (e.g. Manitoba) (USDA Forest Service 2000). Its potential habitat is very limited in this area with the only known location on Black Hills National Forest administered lands at McIntosh Fen Botanical Area. There is also one site on private land near Nahant. Baseline survey and monitoring was conducted in 2000 and 2001 at McIntosh Fen.

The amount of willow and aspen that historically occurred at the fen has declined since the 1930s due to the site's use as an agricultural water source while under private ownership (USDA Forest Service 2000). The Forest Service acquired McIntosh Fen ca. 1980, and has made efforts to restore a measure of the original hydrologic function of the fen by filling in ditches with straw bales to re-establish a saturated organic layer. Autumn willow cuttings were planted using on-site materials.

Current infestations of Canada thistle (*Cirsium arvense*), likely pose a threat to the autumn willow. If the water table continues to rise, due to restoration of the fen's hydrology, it would likely result in a decline in Canada thistle, but would pose an increased risk of infestation from wetland noxious weed species, such as purple loosestrife (*Lythrum salicaria*). Noxious weed treatments are, and would be, beneficial to the species provided that they are applied correctly (USDA Forest Service 2000).

As with other R2 Sensitive plant species, a primary risk identified for this species could be the invasion of purple loosestrife into the sites that are located within riparian areas. Purple loosestrife is not currently known to occur at the *S. serissima* sites, or anywhere close by, but if it invades the area, it is very aggressive and has the potential to impact the species. Because of the primary risk to the species being purple loosestrife invasion, monitoring should document if purple loosestrife occurs at the monitoring location. Active treatment measures are to be taken if purple loosestrife is located.

A large proportion of the Black Hills is under private ownership and other lands administered by agencies other than the Black Hills National Forest. It is expected that *S. serissima* occurs on these lands, but it is unknown as to what habitats the species may be occurring in or what impacts weeds or weed treatments may be having on those populations.

The impacts to *S. serissima* from weeds or weed treatment on lands in ownership other than those administered by Black Hills National Forest are unknown at this time. Refer to the FEIS Appendix H and Appendix G of the Phase I Amendment for additional discussion of cumulative effects.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service

policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. An invasion of purple loosestrife at the *S. serrisima* site becomes high priority for control efforts. Areas of purple loosestrife in and adjacent (Castle Creek) to *S. serrisima* are to be treated, or need to keep from setting seed if not chemically treated. Control efforts that are least likely to impact or kill *S. serrisima* individuals are to be used.

**Determination:** For the proposed alternative, a determination of “May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for *S. serrisima*.

### **Corallorhiza odontorhiza (Autumn Coralroot)**

*Corallorhiza odontorhiza* occurs from Maine to southern Minnesota and south to Florida and Mexico (Gleason and Cronquist 1991). The species is a rare, eastern deciduous forest orchid with a disjunct distribution in the Black Hills, wherein its specific habitat needs are unknown (USDA Forest Service 2000). In the Black Hills, autumn coralroot is known from a single, confirmed occurrence in 1971 in Lawrence County, SD from pine forest habitat southeast of Deadwood (Lawrence 1973 in Ode, personal communication Dec. 7, 2000). However, an exact location has not been determined from the existing record and has not been successfully relocated to date (Ode, pers. comm., Sept. 20, 2000). Because of its distribution in forest habitats elsewhere, because it has been reported in pine forest in the Black Hills, and because none of the coralroots occur in grasslands or meadows, it may be assumed that it is a forest species (USDA Forest Service 2000). Due to difficulties in consistently relocating the species (see Natural History below), its range of optimal and suitable habitat in the Black Hills cannot be defined at the present time. A number of days were spent searching for this species in 2001, but no individuals were located. Survey and monitoring for occurrence and quantifiable population information will continue on the Forest and individuals will be counted and protected.

Coralroots are perennial, terrestrial, mycorrhizal obligate erect herbs that are rootless, leafless, largely without chlorophyll, with much branched rhizomes, and often occur in groups or large colonies (Great Plains Flora Association 1986). Plants appear sporadically in woodland litter, where they may disappear for years then reappear during suitable climate conditions. It is assumed that the species requires decaying woody plant material above or below ground, wherein a mycorrhizal relationship is probably an important factor, as it is for other coralroot species (USDA Forest Service 2000).

However, the species is notoriously difficult to detect, due to its inconspicuous habit and tendency to go dormant for years at a time (USDA Forest Service 2000). For this reason, it is difficult to monitor this species. *Corallorhiza odontorhiza* has been listed as a species that is scarce and very localized in undisturbed habitats but that can occur prolifically following a disturbance (Dressler 1990). Currently, there is not sufficient ecological information on the species to define its habitat in the Black Hills.

Because so little is known about the species habitats and distribution, the effects of noxious weeds are uncertain. Noxious weed invasions are likely a risk to the overall health and population persistence of all sensitive plant species and their associated plant communities, as well as *C. odontorhiza*.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed the effect of noxious weed control activities is expected to be neutral for both alternatives for *C. odontorhiza* on BHNF administered lands.

**Determination:** Because the species has not been found in the Black Hills for 30 years it is not possible to acknowledge its occurrence on NFS land or to evaluate the potential effects of management activities upon the species' habitat(s), individuals or populations. For this reason, an informed determination cannot be made at this time for *Corallorhiza odontorhiza*.

### **Botrychium campestre (Prairie Moonwort)**

*Botrychium campestre* is a North American endemic that ranges from the Canadian provinces of Alberta, Ontario, and Saskatchewan to Colorado, Iowa, Michigan, Minnesota, Montana, Nebraska, New York, North Dakota, South Dakota, Wisconsin and Wyoming (Flora of North America 1993). Prairie moonwort is a grassland species originally described from the loess prairies of Iowa and dune habitats around the Great Lakes. In the Black Hills, it is known from a single occurrence in ponderosa pine forest at 5000 feet elevation in the Bear Lodge Mountains in Crook County, Wyoming (Fertig

1993; USDA Forest Service 2000). Because it is normally a species of plains and dune habitats, its occurrence in the Black Hills is very unusual and confounds our understanding of its habitat and distribution here. The species is notoriously difficult to detect during seasonal surveys and is considered rare, but it is not known how rare (USDA Forest Service 2000). During resurvey of the only known occurrence in 2001, a *Botrychium* species was located, but its specimens sent to Dr. Don Farrar were not *B. campestre*. Genetic testing will occur this winter to confirm the identity of individuals sent to Dr. Don Farrar, Ames, IA. Many *Botrychium* species have received taxonomic classification publication since 1980 (Flora of North America 1993), with many more species recognized than at the time the Bearlodge population was described in the 1970's. For accurate identification, a substantial number of leaves are usually needed because of the large amount of variation found in most species. Based on the significant amount of new information on moonwort that has been published since the 1970's, the Forest will likely request a re-evaluation of the single herbarium specimen currently listed as *B. campestre*.

Moonwort is primitive ferns that are generally small and inconspicuous, normally consisting of a single leaf produced each year from an underground stem. They reproduce by wind- or animal-dispersed spores, which may take ten years or more to produce a leaf from the sporophyte. The spore-producing period occurs in the early spring with the above ground stems dying back in late spring and early summer (Fertig 1993), as was evident on the *Botrychium* site at Bearlodge in 2001. They are long-lived, early-successional plants that appear to require disturbed soil to become established, which is typical of the *Botrychiums* (Don Farrar pers. comm., February 8, 1996).

In general, the effects of noxious weeds and their treatment on *B. campestre* cannot be addressed because so little is known about the species distribution and habitat preferences in the Black Hills (USDA Forest Service 2000), and because of the questions that have arisen during 2001 on the identity of the *Botrychium* site in the Bearlodge Mountains of the Black Hills. Noxious weed invasions are likely a risk to the overall health and population persistence of all sensitive plant species and their associated plant communities, as well as to the *Botrychium* species that is located in the Bearlodge Mountains.

Noxious weed treatments under both alternatives will focus on treating individual plants or groups of plants instead of broadcast chemical treatments. Forest Service policies/guidance and E.P.A. label instructions for herbicide application will be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff. The lowest application rate recommended for effective control of a given undesirable plant species would be used.

Pre-treatment surveys and assessments will be conducted to determine the presence and proximity to listed species. If any sensitive species are identified during these surveys, the control options will be limited, in most cases, to manual control techniques. Because this site is the only known location for this *Botrychium* on Black Hills administered

lands, the site should be monitored and if noxious weeds found, they need to be treated if following evaluation, they pose a risk to the persistence of this population. Consultation with Dr. Farrar or the State Heritage program needs to occur for selection of treatment method.

In general, management practices that minimize impacts to the species' habitats from the introduction of noxious weeds are anticipated to reduce viability risks to this species. If these precautions are followed the effect of noxious weed control activities is expected to be neutral for both alternatives for *Botrychium spp.* on BHNF administered lands.

**Determination:** Because of the recent question identity of the *B. campestre*, and the likelihood that this R2 sensitive species even exists on lands administered by the Black Hills, an informed determination cannot be made at this time for *B. campestre*.

## **References**

- Allen, A.W. 1984. The relationship between habitat and furbearers. In: Novak, M., Baker, J.A., Obbard, M.E., comps. Eds. Wild Furbearer Management and Conservation in North America. North Bay Ontario: Ontario Trappers Association: 164-179.
- Behler, J.L., and F.W. King. 1979. The Audubon Society Field Guide to North American Reptiles and Amphibians. Alfred A. Knoph, Inc. New York, NY.
- Bennett, L. A. 1984. Marten Ecology and Habitat management in the central Rocky Mountains. Progress Report for USDA Forest Service. Purchase Order 40-82LM-3-158. Colorado State University. Fort Collins.
- Buskirk, S.W. 1984. Seasonal use of resting sites by marten in south-central Alaska. Journal of Wildlife Management 48(3): 950-953.
- Buskirk, S. W., and L. F. Ruggiero. 1994. American Marten. In Roggiero, L.F., K.B. Aubry, S.W. Buskirk, Eds. The Scientific basis for Conserving Forest Carnivores in the Western United States. USDA Forest Service. Rocky Mountain Range and Experiment Station. Gen. Tech. Report RM-254
- Buskirk, S.W., and R.A. Powell. 1994. Habitat ecology of fishers and American martens. In: Buskirk, S.W., A.S. Harestad, and M.G. Raphael, comps. Eds. Martens, sables, and fishers: biology and conservation. Ithaca, N.Y.: Cornell University Press: 283-296.
- Clark, T.W., A.H. Harvey, R.D. Dorn, D.L. Genter and C. Groves, Eds. 1989. Rare, Sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 pp.

Cohn, J.P. 1994. Salamanders Slip-sliding Away or Too Surreptitious to Count? *Bio Science* 44(4): 219-223.

Davis, M.H. 1983. Post-release movements of introduced marten. *Journal of Wildlife Management* 47(1): 59-66.

Dixon, R.D., and V.A. Saab. 2000. Black-backed Woodpecker (*Picoides arcticus*). In *The Birds of North America*, No. 509 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Dressler, Robert L. 1990. *The orchids: Natural history and classification*. Harvard University Press. Pp. 74-77.

ENSR Consulting and Engineering. 1990. Summary report American burying beetle survey. Brohm Mining Corporation. Document number 1063-002. Deadwood, SD.

Farrar, Donald R. February 8, 1996. Personal Communication with Deanna Reyher.

Farrar, Donald R. June 25, 2001. Personal Communication with Deanna Reyher.

Fertig, Walter. 1993. Black Hills National Forest Sensitive Plant Field Guide. Unpublished report prepared for Black Hills National Forest by the WYNDD, Laramie, WY.

Fertig, Walter. 1994. *Carex alopecoidea* in: Wyoming Rare Plant Field Guide. The Wyoming Rare Plant Technical Committee. Jamestown, ND. Unpaginated.

Fertig, Walter. 1998. Letter to Deanna Reyher. December 22, 1998.

Fertig, Walter. 2000a. Status Review of the Ute Ladies' Tresses (*Spiranthes diluvialis*) in Wyoming. Report prepared for the Wyoming Cooperative Fish and Wildlife Research Unit, US FISH and Wildlife Service, and the Wyoming Game and Fish Department by the Wyoming Natural Diversity Database, Laramie, Wyoming.

Fertig, Walter. 2000b. State Species Abstract. Wyoming Natural Diversity Database. *Spiranthes Diluvialis* Ute Ladies' Tresses. Updated: March 23, 2000.

Flora of North America Editorial Committee. 1993. *Flora of North America, North of Mexico*, Vol. II: Pteridophytes and Gymnosperms. Oxford University Press. Pp. 28-30, 85-106.

Fredrickson, L.F. 1981. Pine marten introduction into the Black Hills of South Dakota, 1980-81. Pierre, SD: South Dakota Department of Game, Fish and Parks; Progress Report #84-14. 8pp.

Frest, T.J., and E.J. Johannes. 1993. Land Snail Survey of the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service and USDI Fish and Wildlife Service.

Gehlbach, F.R. 1967. *Ambystoma tigrinum*. Catalogue of American Amphibians and Reptiles 52.1-52.4.

Gleason, H. A. and A. Cronquist. 1991. Manual of the vascular plants of northeastern United States and adjacent Canada, Second Edition. New York Botanical Garden, New York.

Great Plains Flora Association. 1986. Flora of the Great Plains. University Press of Kansas, Lawrence, Kansas. 1402 pp.

Hargis, C. D., J. A. Bissonette, and D. L. Turner. 1999. The influence of forest fragmentation and landscape pattern on American martens. *Journal of Applied Ecology* 36: 157-172. British Ecological Society.

Higgins, K.F., E.D. Stukel, J.M. Goulet, and D.C. Backlund. 2000. Wild Mammals of South Dakota. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota. 278p.

Intermountain Ecosystems, L.C. 1998. Powder River Basin Expansion Project: Inventory for the Ute Ladies' Tresses (*Spiranthes diluvialis* Sheviak). IN: Appendix K of Draft Environmental Impact Statement. Finance Docket No. 33407 – Dakota, Minnesota, & Eastern Railroad Corporation. Volume VIII-A.

Jameson, M.L., and B.C. Ratcliffe. 1991. A survey to determine the occurrence of *Nicrophorus americanus* Oliver (the American burying beetle) along the proposed U.S. 14 road project in South Dakota (Project F 0014(A3)151). Final Report to the South Dakota Department of Transportation. University of Nebraska State Museum. Lincoln, NE.

Jones Jr. J., D.M. Armstrong, R.S. Hoffmann, and C. Jones. 1983. Mammals of the Northern Great Plains. University of Nebraska Press.

Larson, Gary E. 1993. Sensitive Plant Survey of Needles Project Area. Unpublished report prepared for the Black Hills National Forest.

Larson, Gary E. and James R. Johnson. 1999. Plants of the Black Hills and Bear Lodge Mountains: a field guide with color photographs. A South Dakota State University, College of Agriculture and Biological Sciences Book. Pp. 294-295, 368.

Leachman, B., and B. Osmundson. 1990. Status of the mountain plover: a literature review. U.S. Fish and Wildlife Service, Golden, Colorado. 83pp.

Lynch, J.D. 1978. The Distribution of Leopard Frogs (*Rana blairi* and *Rana pipiens*) (Amphibia, Anura, Ranidae) in Nebraska. *Journal of Herpetology* 12(2): 157-162.

Mantas, Maria. 1993. Ecology and reproductive biology of *Epipactis gigantea* Dougl. (Orchidaceae) in northwestern Montana. M. S. Thesis, University of Idaho, Moscow, Idaho. 73 pp.

Marriott, Hollis J. 1991b. Suitability investigation report. Unpublished report prepared for Black Hills National Forest.

Marriott, Hollis J. February 22, 2001. Floristic Inventory of the Black Elk Wilderness, Black Hills National Forest, South Dakota. Challenge Cost Share Agreement between Black Hills National Forest, Custer, South Dakota and South Dakota Game, Fish and Parks, Wildlife Division.

Marrone, G.M. 1993. A survey to determine the presence of the endangered American burying beetle (*Nicrophorus americanus*) on the Fort Pierre National Grassland in South Dakota. Final Report to the U.S.D.A., Forest Service. Fort Pierre National Grassland, Pierre, SD.

Moffat, M., and N. McPhillips. 1993. Management for Butterflies in the Northern Great Plains: A Literature Review and Guidebook for Land Managers. U.S.D.I., Fish and Wildlife Service. Ecological Services. Pierre, SD.

Oakleaf, B., B. Luce, S. Ritter, and A. Cerovski, Eds. 1992. Wyoming Bird and Mammal Atlas. Wyoming Game and Fish Dept. Cheyenne, WY.

Ode, D. and Hollis J. Marriott. 1990. Sensitive plant surveys in the northwestern Black Hills. Report prepared for the Black Hills National Forest by the South Dakota Game, Fish and Parks Department and the Wyoming Natural Diversity Database.

Ode, David. September 20, 2000. E-mail communication with Cara Staab.

Ode, David. December 7, 2000. E-mail communication with J. Hope Hornbeck.

Ode, David. September 19, 2001. E-mail communication with Deanna Reyher.

Parrish, J.B., D.J. Hermann, and D.J. Reyher. 1996. A Century of Change in the Black Hills Forest and Riparian Ecosystems. U.S. Forest Service, Agricultural Experiment Station, South Dakota State University. 20pp.

Pierson, E. D., M. C. Wackenhut, J. S. Altenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species Conservation Assessment and Strategy for Townsend's Big-eared Bat (*Corynorhinus townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho.

Reynolds, R.T., and S.M. Joy. 1998. Distribution, Territory Occupancy, Dispersal, and Demography of Northern Goshawk on the Kiabab Plateau, Arizona. Final Report for Arizona Game and Fish Heritage Project No. I94045. Rocky Mountain Research Station, Fort Collins, CO.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwest United States. Gen. Tech. Rep. RM-217. Ft. Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 90pp.

Royer, R.A., and G.M. Marrone. 1992a. Conservation Status of the Tawny Crescent (*Phycoides batesii*) in North and South Dakota. Denver, Co.: USDI Fish and Wildlife Service.

Royer, R.A., and G.M. Marrone. 1992b. Conservation Status of the Regal Fritillary (*Speyeria idalia*) in North and South Dakota. Denver, Co.: USDI Fish and Wildlife Service.

Russell, Norman H. 1965. Violets (*Viola*) of Central and Eastern United States: an introductory survey. SIDA Contributions to Botany, Volume 2, Number 1, March 1965. p. 107

South Dakota Ornithologists' Union. 1991. The Birds of South Dakota, 2<sup>nd</sup> Edition. Aberdeen, S.D. Northern State Univ. Press.

Spencer, W.D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. *Journal of Wildlife Management* 51(3): 616-621.

Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. *Journal of Wildlife Management* 47(4): 1181-1186.

Schweitzer, D.F. 1995. Element Stewardship Abstract for *Speyeria idalia* Regal Fritillary. The Nature Conservancy. Boston, MA.

Steinauer, Robert F. and Terri Hildebrand. 1998. Inventory for *Spiranthes diluvialis* Sheviak, Fall River County, South Dakota. Unpublished report to South Dakota Game, Fish and Parks Department, 523 East Capitol Avenue, Pierre, SD.

Terres, J.K. 1991. The Audubon Society Encyclopedia of North American Birds. Wings Books, New York. 1108 pp.

Tobalski, B.W. 1997. Lewis' Woodpecker (*Melanerpes lewis*). In *The Birds of North America*, No. 284 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

- Turner, R.W. 1974. Mammals of the Black Hills of South Dakota and Wyoming. University of Kansas Museum of Natural History. Miscellaneous Publication 60.
- Uresk, D.W., and J.C. Sharps. 1986. Denning Habitat and Diet of the Swift Fox in Western South Dakota. *Great Plains Naturalist* 46(2): 249-253.
- Uresk, D.W., J.G. MacCracken, and A.J. Bjugstad. 1982. Prairie Dog Density and Cattle Grazing Relationships. In Timm, R.M., and R.J. Johnson, Eds. Proceedings of the fifth Great Plains wildlife damage control workshop; 1981 October 12-15; Lincoln, NE: Institute of Agriculture and Natural Resources, University of Nebraska: 199-201. 299p.
- USDA Forest Service. 1996. 1996 Revised Land and Resource Management Plan Final Environmental Impact Statement. Forest Service. Custer, South Dakota.
- USDA Forest Service. October 2000. Expert Interview Summary for the Black Hills National Forest Land and Resource Management Plan Amendment. Unpublished report, USDA Forest Service, Black Hills National Forest, Custer, South Dakota. [http://fsweb.blackhills.r2.fs.fed.us/int\\_dir/00\\_10\\_25\\_ExpertInterviewSum.pdf](http://fsweb.blackhills.r2.fs.fed.us/int_dir/00_10_25_ExpertInterviewSum.pdf)
- U.S. Fish and Wildlife Service. 1988. Black-footed ferret recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 154pp.
- U.S. Fish and Wildlife Service. 1994. Final environmental impact statement: black-footed ferret reintroduction, Conata Basin/Badlands, South Dakota. U.S. Fish and Wildlife service, Pierre, South Dakota.
- U.S. Fish and Wildlife Service. 2001. Mountain plover survey guidelines. U.S. Fish and Wildlife Service, Cheyenne, WY. 7pp.
- Van Der Pijl, L. and C. H. Dodson. 1966. Orchid flowers: Their pollination and evolution. University of Miami Press, Coral Gables. Pp. 27-32, 83-90.
- Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy, and M.R. Eames. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Gen. Tech. Rep. PNW-GTR-485. Portland, OR.
- Zacharkevics, Katherine. December 20, 2000. Personal communication with J. Hope Hornbeck.