Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Region / Black Hills National Forest October 2023

Black Hills National Forest

Revised Forest Assessment:

At-Risk Species

American three-toed woodpecker and Leedy's Roseroot growing on rock (right), Black Hills National Forest.

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Chapter 1. Introduction

The Black Hills National Forest is in western South Dakota and northeastern Wyoming. It contains 1.2 million acres of forested hills and mountains, approximately 110 miles long and 70 miles wide. The Black Hills National Forest supports a variety of habitat types that extend from the shortgrass prairie zone to a high of 7,244 on the summit of Black Elk Peak. Twenty-two ecosystems were identified on the Black Hills National Forest and analyzed in three assessments: Forested Ecosystems; Non-Forested Terrestrial Ecosystems; and Aquatic, Riparian and Groundwater Dependent Ecosystems. These ecosystems support over 300 wildlife and fish species that occur on the Black Hills National Forest. The diversity of ecological conditions provides habitats essential for maintaining populations for a diverse array of native plant, animal, and fish species.

The Black Hills National Forest is unique in its diversity of ecosystems and associated habitat types influenced by the unique nature of the 1.25 million acres of forested hills surrounded by (and isolated by) the prairies of the Northern Great Plains. The ecosystem diversity provides habitat for large populations of mule deer, white-tailed deer, wild turkey and Rocky Mountain elk, which in turn attract a large number of hunters annually to Wyoming and South Dakota. This influx of people provides a large economic benefit to businesses and communities in and around the Black Hills National Forest.

Assessment 5 Development Process

As part of revising its land management plan, the 2012 planning rule requires the Forest Service to assess the Black Hills National Forest's At-Risk species and to identify the subset of Species of Conservation Concern (SCC) for the plan area. The purpose of assessing at-risk species is to help develop forest plans that maintain the diversity of plant and animal communities and provide for the persistence of native species in the plan area. Most species will be maintained by plan components that provide for broad ecosystem integrity and ecosystem diversity. Some at-risk species may need more specific plan components to provide for their persistence on the Black Hills National Forest.

Forest Service Handbook direction for Identifying and Assessing At-risk Species is found at 1909.12, Chapter 10, Section 12.5 – Identifying and Assessing At-risk Species. We used the following approach.

1. Staff at the Black Hills National Forest and the Forest Service Region 2 office used the direction at FSH 1909.10 to develop an initial list of at-risk species on the Black Hills National Forest. The list of at-risk species includes:

    - Species federally recognized under the Endangered Species Act as threatened, endangered, proposed or candidate (TEPC) (FSH 1909.12_10 sec. 12.51). Federally listed species appropriate to consider in the planning process were identified with the U.S. Fish & Wildlife Service (USFWS).
    - Potential SCC. The existing Regional Forester's sensitive species list provided the starting point for the list of potential SCC to consider. This was supplemented by species that "must" be considered (those with NatureServe or Wyoming/South Dakota Natural Heritage Program (NHP) rankings G/T1 or G/T2 , and species that

"should" be considered; those with NatureServe/NHP rankings G/T3, S1, or S2 (definitions included in Appendix 2), as well as species identified from various other sources (sources for this assessment included the Bison Database, Intermountain Herbarium Consortium, Bird Conservancy of the Rockies, Xerces Society, and staff reports). This assessment also considers species with an S3 ranking on NatureServe or NHP. Generally, NatureServe and State Natural Heritage Programs concurred on both state and global status rankings. In cases where they did not, we deferred to the more "imperiled" score.

- Much of this information is geospatially referenced, allowing staff to determine which of these species were found within the Black Hills National Forest boundary. The requirements and criteria for considering a species as a potential SCC are specified in FSH 1909.12 Chapter 10 section 12.52.

2. For each of the at-risk species that is known to occur on the Black Hills National Forest, we completed a "species overview" based on details in FSH 1909.12. These overviews (USDA Forest Service 2023a and 2023b) are designed to capture the best available science information following current manual and handbook direction. These overviews highlight key elements of life history, distribution, risk factors and ecological conditions necessary for recovery, conservation and viability of at-risk species. Species overviews include key information gaps and uncertainties.
3. Resource specialists, including Black Hills National Forest district wildlife biologists and botanists, Forest staff and RO staff, reviewed and refined species overviews.
4. For at-risk species, we used the species overviews to populate a species spreadsheet that includes the ecosystem/s and ecological conditions required by each species, and risk factors that influence recovery, conservation, and viability. In developing the ecological conditions database, we captured information directly as it is reported in the scientific literature rather than develop an *a priori* list of ecological conditions and risk factors. As we populated the database, we aggregated information into common terminology across species as appropriate. Using these species overviews to populate the species spreadsheet captures the ecosystems, key ecological conditions, and risk factors for each species.
5. We used the following steps to assess the current status of potential at-risk species and likely future trends on the forest.

   A. Working with species from the "initial" list of at-risk species, we correlated ecosystems and ecosystem conditions and features with those described in the *Terrestrial Ecosystems, Non-Forested Terrestrial Ecosystems* and *Aquatic, Riparian and Groundwater Dependent Ecosystems assessments*.

   B. We used ecosystem trends identified from step 5A and documented risk factors to identify the list of potential SCC for the Black Hills National Forest, and to identify which species to potentially not carry forward as SCC.

   C. We identified the ecosystem conditions and features in the species overviews that were not described in the *Terrestrial Ecosystems* and *Aquatic and Riparian Ecosystems assessments*. These information gaps may be carried forward for future research and/or monitoring to better inform management of SCC species.

   D. Individual species overviews are available as supporting information.

Use of Best Available Science

Sources of data for this assessment include various published and unpublished reports and data. Key sources include:

- Information compiled as part of the Rocky Mountain Region's Species Conservation Project (http://www.fs.usda.gov/detail/r2/landmanagement/?cid=stelprdb5177128)
- Peer-reviewed literature and other scientific reports
- Information on species occurrence, distribution and abundance provided by the Natural Heritage Programs of South Dakota and Wyoming.
- NatureServe (http://www.natureserve.org/)
- Black Hills National Forest species occurrence records as documented in the Forest Service Natural Resource Manager NRIS Wildlife database.
- Black Hills National Forest Botany database (unpublished)
- The Intermountain Herbarium Consortium (http://www.intermountainbiota.org/portal/index.php)
- Bird Conservancy of the Rockies (http://www.birdconservancy.org/)

Information Gaps

The following habitats, feature and conditions are not addressed or are not fully addressed in the Black Hills National Forest ecosystem assessments, so less is known about the conditions of these resources on the Forests:

- Caves and mines
- Rock outcrops, cliffs, and talus slopes are mentioned in the Terrestrial Ecosystem Assessment, but there is no in-depth assessment.
- Substrates – shale, limestone, calcareous, etc. These are mapped and are known to forest staff but were not analyzed in the assessments.

In general, the process used to identify potential SCC appears to result in a greater emphasis on plants and insects than previous efforts to designate species for conservation-focused attention, such as the Regional Forester's Sensitive Species list. This is due to the information sources required by the planning rule. These sources cover a wider array of species more systematically than previous species planning efforts. More information regarding rare plant species, as well as plant species required by insects for nectar or to host caterpillars, may be warranted.

Unlike the Regional Forester's Sensitive Species list, a species can be SCC on one forest but not on another, even if it occurs on both. The SCC list is developed by the Regional Forester through the Regional Office (R2, in Lakewood, Colorado), but the forest plan is developed and approved by the Forest Supervisor.

When the new forest plan is finalized the Regional Forester's Sensitive Species list will no longer apply to the Black Hills. Sensitive Species are "those plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trend in numbers or density" and..."habitat

capability that would reduce a species existing distribution." Sensitive species in the Forest Service are identified by Regional Foresters, aimed to avoid trends toward federal listing and to maintain viability.

That criteria is different than that used to develop the SCC list. As such the lists will not be the same. Some species not on the Sensitive Species list will be SCC, and some species that are on the Sensitive Species list will not be SCC.

Pollinator decline is an increasingly severe issue. The causes are still under debate, the impact is still being determined, but the general trend is apparent. Domestic honeybees get much of the attention, but native bee species such as the western bumblebee (*Bombus occidentalis*) are also impacted as are butterflies, moths, and other pollinator insect species. There is little to no active population or habitat monitoring of these species.

Scale of Analysis Area

For most species, the scale of assessment is the plan area – the Black Hills National Forest. Private, state, or non-USFS federal lands surrounded by the National Forest are not considered to be part of the plan area. For the determination of whether or not a given species should be considered as an SCC, assessment must be limited to the plan area. With respect to federally listed threatened and endangered species, as well as proposed and candidate species, the assessment may include species not present immediately within the plan area, such as endangered Black-footed ferret. They are not within the plan area, but the plan may impact the potential for range expansion.

Management of the National Forest can have impacts on areas outside the forest. Such impacts will be analyzed in the forest plan's Environmental Impact Statement but have no bearing on the determination of what species may be designated as SCC.

Big Game and other Species Not Covered by this Analysis

The focus of this assessment is at risk species – TEPC and SCC as defined by the planning rule. The Black Hills National Forest is also home to a variety of species that are not at risk, at least not under the definition used in the planning rule.

Big game species that do not meet the criteria for At-Risk are therefore not addressed in the assessment. This includes fur bearers, non-native sport fish, white-tailed deer, mule deer, wild turkey, Rocky Mountain elk, and others. These species have immense social value, people come from far away to view and hunt such wildlife and this is a significant driver in the local economy and culture.

However, such species are not the focus of this assessment. Big game numbers and the Forest Service's role in managing them will be analyzed in detail in the forest plan and the Environmental Impact Statement that supports the plan. The Forest Service does not issue hunting permits, that is a role of State government. However, the Forest Service can influence hunting via recreational access (roads and trails) management and through habitat management.

Although that is not the focus of this assessment, the issue is important and will not be ignored as the planning process moves forward.

However, there can be overlap between SCC and big game, furbearers and sport fish in that some SCC can be legally hunted, trapped or fished.

Legal hunting generally is not a risk factor for species on the Black Hills National Forest. Hunting is regulated by the South Dakota Department of Game, Fish and Parks and the Wyoming Fish and Game Department. One goal of both agencies is to maintain stable populations of game species. As such, legal hunting/trapping/fishing is unlikely to create risk for continued persistence of these species in the plan area. Hunting, trapping and fishing permits are issued by these two agencies of their respective state governments, but the final SCC designation is made by the USFS, an agency of the federal government. This makes it possible for some potential SCC species to be legally hunted or trapped or fished. The fact that state agencies allow hunting of a given species does not disqualify that species for inclusion as SCC. This is the result of different agencies making different determinations, based on different criteria.

Federally Recognized Species

Species analyzed in the assessment as threatened, endangered, proposed and candidate (TEPC) are determined partly by the USFWS, through application of the Information and Planning for Consultation (IPaC) system (currently a web-based application, USFWS 2023). This can include species that are not known to occur in the plan area, but which may be affected by management of the plan area (such as fish species affected by downstream impacts). IPaC may also identify TEPC species that have potential to be reintroduced or to recolonize the plan area if those species were formerly present in the plan area. In addition, the USFS must analyze any plant or animal species known to be present on the forest that are listed as TEPC by the USFWS through its implementation of the Endangered Species Act (ESA). The USFS is obligated to do this whether or not their presence in the plan area is highlighted in IPaC.

The following TEPC species are currently or formerly known to occur in the plan area or may be impacted by management of the Black Hills National Forest (Table 1).

Table 1. Threatened, endangered, proposed or candidate species

Species	ESA Status	Occurrence data
Black-footed ferret *Mustela nigripes*	Endangered	1 historic occurrence on Bearlodge Ranger District. Nearby reintroduction sites on National Park Service managed lands adjacent to Black Hills National Forest.
Northern long-eared bat *Myotis septentrionalis*	Endangered	106 known records on several ranger districts.
Tricolored bat *Perimyotic subflavus*	Proposed	24 records from 6 different locations in the plan area. Five mines and one pond.

Species	ESA Status	Occurrence data
Red knot *Calidris canatus rufa*	Threatened	No known occurrences in the Plan Area
Monarch butterfly *Danaus plexippus*	Candidate	Six records from the plan area (Hell Canyon and Mystic Ranger Districts)
Leedy's roseroot *Rhodiola integrifolia* ssp. L*eedyi*	Threatened	One record from Black Elk Peak
Ute ladies'-tresses *Spiranthes diluvualis*	Threatened	No known occurrences in the Plan Area

We compiled information regarding the TEPC species for the plan area, presented in "Appendix 1: Threatened, Endangered, Proposed and Candidate species ecosystems and habitat characteristics." For those TEPC species documented as present on the Black Hills National Forest, they were grouped with information regarding other at-risk species to compile the "Key Ecosystem Characteristics" in the following section.

Under the Endangered Species Act, the USFWS makes the primary determination of which species to analyze for a given proposal. This list may include species that are not present in the proposal or plan area. The Forest Service does not have discretion to exclude any species from analysis that is included within the list obtained from USFWS. In such cases where the species is not present in the area, the analysis can look at impacts to potential habitat and the probability of recolonization.

Chapter 2. At-Risk Species

In the 2012 Planning Rule "At-Risk" includes species that are listed by the USFWS as Threatened, Endangered, Proposed or Candidate (TEPC) under the Endangered Species Act as well as SCC.

The decision of which Endangered Species Act regulated species to analyze was made by the USFWS and communicated to the USFS via the Information for Planning and Consultation IPaC web-based application.

The initial determination of which species are SCC on the Black Hills National Forest was made by the Forest Service prior to the development of this assessment. As outlined in the "Assessment 5 Development Process" section of Chapter 1, potential species were identified and analyzed based on criteria from the 2012 Planning Rule.

This was done via species overviews (USDA Forest Service 2023a and 2023b) developed for each species that met the "must" or "should" consider criteria from the Planning Rule, as well as other species included based upon professional judgement of USFS staff. Criteria from Planning Rule Section 12.52d 3(f) were used to determine which species would be designated SCC.

Those criteria include:

1. Significant threats, caused by stressors on and off the plan area, to populations or the ecological conditions they depend upon (habitat). These threats include climate change.
2. Declining trends in populations or habitat in the plan area.
3. Restricted ranges (with corresponding narrow endemics, disjunct populations, or species at the edge of their range).
4. Low population numbers or restricted ecological conditions (habitat) within the plan area.

Based upon information compiled in the species overviews and analyzed under the criteria in the 2012 Planning Rule section 12.52d 3(f) the following species meet the criteria as SCC in the forest plan for the Black Hills National Forest.

Plants:

- Sleepy needlegrass (*Achnatherum robustum*)
- Southern maidenhair fern (*Adiantum capillus-veneris*)
- Ragged-leaf false goldfields (*Amauriopsis dissecta*)
- Two-form Pussytoes (*Antennaria dimorpha)*
- Groundnut (*Apios americana)*
- Bright green spleenwort (*Asplenium trichomanes-ramosum*)
- American milkvetch (*Astragalus americanus*)
- Summer milkvetch (*Astragalus hyalinus*)

- Bartramia moss (*Bartramia pomiformis* var. *pomiformis*)
- Alpine bistort **(***Bistorta vivipara*)
- Frenchman's bluff grapefern (*Botrychium gallicomontanum*)
- Mingan Moonwort (*Botrychium minganense*)
- Leathery grapefern (*Botrychium multifidum*)
- Pointed tip mariposa lily (*Calochortus apiculatus*)
- Fairy slipper (*Calypso bulbosa*)
- Marsh bellflower (*Campanula aparinoides*)
- Foxtail sedge (*Carex alopecoidea*)
- Slenderbeak sedge (*Carex athrostachya*)
- Southwestern showy sedge (*Carex bella*)
- Brownish sedge (*Carex brunnescens*)
- Silvery sedge (*Carex canescens*)
- Low northern sedge (*Carex concinna*)
- Emory's sedge (*Carex emoryi*)
- Bronze sedge (*Carex foenea*)
- Limestone meadow sedge (*Carex granularis*)
- Greater bladder sedge (*Carex intumescens*)
- Bristly stalked sedge (*Carex leptalea*)
- Western sedge (*Carex occidentalis*)
- Broom sedge (*Carex scoparia*)
- Blunt broom sedge (*Carex tribuloides*)
- Sheathed sedge (*Carex vaginata*)
- Broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*)
- Squareleaf crestwort (*Chiloscyphus polyanthos*)
- Hoary frostweed (*Crocanthemum bicknellii*)
- Mountain cryptantha **(***Cryptantha cana*)
- Wild comfrey (*Cynoglossum virginianum* var. *boreale*)
- Mountain lady's slipper (*Cypripedium montanum*)
- Nine anther prairie clover (*Dalea enneandra*)
- California oatgrass (*Danthonia californica*)
- Tufted hairgrass (*Deschampsia cespitosa*)
- Slimleaf panicgrass: Slim-leaf witchgrass (*Dichanthelium linearifolium*)
- Fall rosette grass (*Dichanthelium wilcoxianum*)

- Dicranella moss; Spur-necked forklet moss (*Dicranella cerviculata*)
- Schreber's dicranella moss; Schreber's forklet moss (*Dicranella schreberiana*)
- Shortleaf dicranum moss; Shortleaf broom moss (*Dicranum brevifolium*)
- Ontario dicranum moss; Ontario broom moss (*Dicranum ontariense*)
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Longleaf hook moss (*Drepanocladus longifolius*)
- Spinulose woodfern; Spinulose shield fern (*Dryopteris carthusiana*)
- Nylon hedgehog cactus (*Echinocereus viridiflorus*)
- Ovate spikerush (*Eleocharis ovata*)
- Beaked spikerush (*Eleocharis rostellata*)
- Diverseglume wildrye; Interrupted wild rye (*Elymus diversiglumis*)
- Stream orchid; Giant helleborine (*Epipactis gigantea*)
- Dwarf scouring rush (*Equisetum scirpoides*)
- Variegated scouring rush; Variegated horsetail (*Equisetum variegatum*)
- Hooker's sandwort (*Eremogone hookeri* var. *pinetorum*)
- Bitter fleabane (*Erigeron acris*)
- Buff fleabane (*Erigeron ochroleucus*)
- Tall cottongrass; Narrowleaf cotton-grass (*Eriophorum angustifolium*)
- Fendler’s sandmat (*Euphoriba fendleri*)
- Showy prairie gentian (*Eustoma exaltatum* ssp. *russellianum*)
- Idaho fescue (*Festuca idahoensis*)
- Spotted fritillary (*Fritillaria atropurpurea*)
- Downy gentian (*Gentiana puberulenta*)
- Slender cudweed (*Gnaphalium exilifolium*)
- Smooth-capsuled dry rock moss (*Grimmia laevigata*)
- Inflated notchwort (*Gymnocolea inflata*)
- Western oakfern (Gymnocarpium dryopteris)
- Jerusalem artichoke (*Helianthus tuberosus*)
- Shortbristle needle and thread (*Hesperostipa curtiseta*)
- Yellow hawkweed (*Hieracium fendleri*)
- Hypnum moss (*Hypnum pratense*)
- Pinesap (*Hypopitys monotropa*)
- Sierra rush (*Juncus nevadensis*)
- Canada lettuce (*Lactuca canadensis*)

- Large pod pinweed; narrowleaf pinweed (*Lechea intermedia* var. *intermedia*)
- Rice cutgrass (*Leersia oryzoides*)
- Wolf lichen (*Letharia vulpina*)
- Broad lipped twayblade (*Listera convallarioides*)
- Bulbus woodland star (*Lithophragma glabrum*)
- Lung lichen (*Lobaria pulmonaria*)
- Fernleaf biscuitroot (*Lomatium dissectum*)
- Hairy woodrush (*Luzula acuminata* var. *acuminata*)
- Small flowered woodrush (*Luzula parviflora*)
- Stiff clubmoss; bristly clubmoss (*Lycopodium annotinum*)
- Ground cedar; trailing clubmoss (*Lycopodium complanatum*)
- Tree ground pine (*Lycopodium dendroideum*)
- Northern bugleweed (*Lycopus uniflorus*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Onion grass (*Melica bulbosa*)
- Nodding microseris (*Microseris nutans*)
- Five stamen miterwort; five-point bishop's-cap (*Mitella pentandra*)
- Spring forget-me-not (*Myosotis verna*)
- One flowered broomrape (*Orobanche uniflora*)
- Alpine mountain sorrel (*Oxyria digyna*)
- Curled hook moss (*Palustriella falcata*)
- Alpine notchleaf moss; paraleucobryum moss (*Paraleucobryum enerve*)
- Marsh grass of Parnassus (*Parnassia palustris*)
- Giant lousewort (*Pedicularis procera*)
- Wax leaf penstemon (*Penstemon nitidus*)
- Pennsylvania smartweed (*Persicaria pensylvanica*)
- Arrowleaf sweet coltsfoot; (*Petasites frigidus* var. *sagittatus*)
- Threadleaf phacelia (*Phacelia linearis*)
- Little fountain apple moss; philonotis moss (*Philonotis fontana* var. *pumila*)
- American lopseed (*Phryma leptostachya*)
- Virginia groundcherry (*Physalis virginiana*)
- Great Plains bladderpod (*Physaria arenosa* ssp. *argillosa*)
- Lodgepole pine (*Pinus contorta*)
- Limber pine; Rocky Mountain white pine (*Pinus flexilis*)

- Mountain ricegrass (*Piptatherum pungens*)
- Greater featherwort (*Plagiochila asplenioides*)
- Scentbottle; Tall white bog orchid (*Platanthera dilatata*)
- Whorled milkwort (*Polygala verticillate*)
- Jensen's polytrichum moss (*Polytrichum jensenii*)
- Platte River cinquefoil (*Potentilla plattensis*)
- Rough rattlesnake root (*Prenanthes aspera*)
- Purple rattlesnake root; Glaucous Rattlesnake-root; Glaucous White Lettuce (*Prenanthes racemose*)
- Drops-of-gold; Hooker's mandarin; Hooker's fairy bells (*Prosartes hookeri*)
- Intense light and dark lichen; Western antler lichen (*Pseudevernia intensa*)
- Bluebunch wheatgrass (*Pseudoroegneria spicata*)
- Cartilage lichen; fan ramalina; burning bush lichen (*Ramalina sinensis*)
- Felted leafy moss; felt round moss (*Rhizomnium pseudopunctatum*)
- Ontario rhodobryum moss (*Rhodobryum ontariense*)
- Dark beaked moss (*Rhynchostegium serrulatum*)
- Syed's bryum moss (*Rosulabryum laevifilum*)
- Sageleaf willow; hoary willow (*Salix candida*)
- Greenleaf willow (*Salix lasiandra* var. *caudata*)
- Shining willow (*Salix lucida*)
- Autumn willow (*Salix serissima*)
- Bloodroot (*Sanguinaria canadensis*)
- Nodding saxifrage (*Saxifraga cernua*)
- Alberta saxifrage; Western saxifrage (*Saxifraga occidentalis*)
- Heath Earwort (*Scapania irrigua*)
- Woolgrass; cottongrass bulrush (*Scirpus cyperinus*)
- Northern selaginella; ledge spikemoss; rock spikemoss (*Selaginella rupestris*)
- Three nerve goldenrod (*Solidago velutina*)
- Broadfruit bur-reed (*Sparganium eurycarpum*)
- Sphagnum; narrowleaf peatmoss (*Sphagnum angustifolium*)
- Sphagnum; Northern peatmoss (*Sphagnum capillifolium*)
- Sphagnum; flat-top bogmoss; flat-topped sphagnum moss (*Sphagnum fallax*)
- Sphagnum; brown peatmoss (*Sphagnum fuscum*)
- Prairie dropseed (*Sporobolus heterolepis*)
- Sheathed pondweed; ig-sheathed pondweed (*Stuckenia vaginata*)

- Hairy naval lichen (*Umbilicaria hirsuta*)
- Cranberry; large cranberry (*Vaccinium macrocarpon*)
- Thinleaf huckleberry; square-twigged huckleberry; square-twig blueberry (*Vaccinium membranaceum*)
- Small white violet; Macloskey's violet (*Viola macloskeyi*)
- Selkirk's violet; great-spurred violet (*Viola selkirkii*)
- Warnstorfia moss; spring hook moss (*Warnstorfia pseudostraminea*)

Animals:

- Northern goshawk (*Accipiter gentalis*)
- Black-chinned hummingbird (*Archilochus alexandri*)
- Ruffed grouse (*Bonasa umbellus*)
- American dipper (*Cinclus mexicanus*)
- Black-billed cuckoo (*Coccyzus erythropthalmus*)
- American kestrel (*Falco sparverius*)
- Black-backed woodpecker (*Picoides arcticus*)
- American three-toed woodpecker (*Picoides dorsalis*)
- Brewer's sparrow (*Spizella breweri*)
- Pinyon jay (*Gymnorhinus cyanocephalus*)
- Pacific marten (*Martes caurina*)
- Bighorn sheep (*Ovis canadensis*)
- American beaver (*Castor canadensis*)
- Finescale dace (*Chrosomus neogaeus*)
- Western bumblebee (*Bombus occidentalis*)
- Cooper's mountainsnail (*Oreohelix cooperi*)
- Callused vertigo snail (*Vertigo arthuri*)
- Hoary bat (*Lasiurus cinereus*)
- Little brown bat (*Myotis lucifugus*)
- Fringed myotis (*Myotis thysanodes)*
- Long-eared myotis (*Myotis evotis*)
- Long-legged myotis (*Myotis volans)*

The USFS Planning Rule handbook suggests that the following criteria be used to determine the status of each At-Risk species present on the forest. This is not "status" in the sense of determining whether or not a given species is At-Risk (SCC or TEPC) but is rather the status/condition of species that have already been determined to be At-Risk.

1. Describe current distribution of each at-risk species in the plan area.

2. Identify ecological conditions in the plan area necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species (sec. 12.53 of the handbook) and at-risk species grouping (sec. 12.54 of the Handbook). These are the ecological conditions to be considered for at-risk species in the assessment.

3 Ecological conditions assessed by the assessment of key ecosystem characteristics.

4. Identify ecological conditions in the plan area necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species that were not addressed by the assessment of key ecosystem characteristics as follows:

a. Describe the current and likely future status of the ecological conditions necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species, assuming management continues under the current plan.

b. Compare the species' current and likely future status described in paragraph 4a for each at-risk species to the ecological conditions of the natural range of variation, or an alternative ecological reference model (sec. 12.14b of the Handbook).

c. Assess human-related stressors (for example, roads, human disturbance and displacement, dams) and whether they can be managed under Forest Service authorities.

d. Identify other threats or limiting factors (for example, naturally small and isolated populations, climate change) and whether they can be managed under Forest Service authority.

5. Describe the current and projected overall status of the ecological conditions necessary to meet the requirements of 36 CFR 219.9(b) for at-risk species considering the combined ecological conditions addressed through the assessment of key ecosystem characteristics and, if needed, for specific at-risk species or groupings.

6. For those ecological conditions not currently meeting or expected to meet the requirements of 36 CFR 219.9(b) for at-risk species, describe the potential outcome of the at-risk species status and identify the key risk factors, taking into account factors such as time (for example, short-term, long-term, planning period, generations of species), affected life history requirement (for example, loss of part of foraging habitat, loss of all spawning habitat), or affected population dynamic (for example, loss of recolonization routes).

7. Identify those key risk factors influencing the ecological conditions not expected to meet the requirements of 36 CFR 219.9(b) for at-risk species that are or can be influenced by Forest Service management of the plan area.

8. Describe any differences in likely future status of groups of individuals in the plan area that are known to be or highly suspected to be reproductively isolated and separate from the rest of the individuals of at-risk species.

9. Summarize the overall status of each at-risk species or species group (sec. 12.54 of the Handbook) with explanations of which key risk factors weighed most heavily in determining status. Describe the effect of key risk factors on species in simple terms such as the level of resulting vulnerability and the trend in that vulnerability. State the conclusions of the vulnerability status process for each species in a way that is helpful in identifying the need for change and in developing plan components that provide the ecological conditions necessary to sustain the species. The Interdisciplinary Team may support conclusions using the "Issue-Rule-Analysis/Application-Conclusion" model (IRAC) as described in FSH 1909.12, chapter 20, section 21.42. Document the resulting information and status evaluation in the planning record.

Table 2: Geographic Status of each likely At-Risk species on the Black Hills National Forest

Common Name	Scientific Name	Distribution on the Black Hills
Threatened, Endangered, Proposed and Candidate Species		
Black-footed ferret	*Mustela nigripes*	Extirpated from the plan area. 1 historic occurrence on Bearlodge Ranger District. Nearby reintroduction sites on National Park Service managed lands adjacent to Black Hills National Forest, including Wind Cave National Park, Badlands National Park, and other nearby reintroduction sites.
Northern Long-eared bat	*Myotis septentrionalis*	106 known records on several ranger districts
Tricolored bat	*Perimyotic subflavus*	24 records from 6 different locations in the plan area. Five of those locations are mines and one is a pond.
Red knot	*Calidris canatus rufa*	No known occurrences in the plan area
Monarch butterfly	*Danaus plexippus*	Six records from the plan area (Hell Canyon and Mystic Ranger Districts)
Leedy's Roseroot	*Rhodiola integrifolia* ssp. *leedyi*	One record from Black Elk Peak
Ute ladies'-tresses	*Spiranthes diluvualis*	No known occurrences in the plan area
Likely Animal Species of Conservation Concern		
Northern goshawk	*Accipiter gentilis*	The northern goshawk is distributed throughout the Black Hills National Forest during the breeding season in ponderosa pine forests with hundreds of known occurrences. Bruggeman and Kennedy have documented significant loss of breeding habitat for the species on the Black Hills.
Black-chinned hummingbird	*Archilochus alexandri*	Historic distribution of the Black-chinned hummingbird has been limited to the southern edge of the Bear Lodge Mountains in the Black Hills National Forest. Extremely rare, 1 known occurrence in the Black Hills NF.

Ruffed grouse	*Bonasa umbellus*	66 records from mid-elevation aspen, riparian and boreal conifer forests. Most of the records are from the Mystic Ranger District.
American dipper	*Cinclus mexicans*	Distribution in the Black Hills is mainly restricted to spearfish canyon and the canyon's tributaries. However small numbers have been located in other drainages in the Black Hills National Forest.
Black-billed cuckoo	*Coccyzus erythropthalmus*	Historic Distribution in the Black Hills NF is limited to the riparian areas of the Bear Lodge Mountains and Sand Creek area in Wyoming. There are five records of occurrences in the Black Hills National Forest
American kestrel	*Falco sparverius*	Found throughout edge habitats within the plan area. 49 records in the USFS EDW database.
Black-backed woodpecker	*Picoides arcticus*	158 known occurrences in the Black Hills NF since 1958.
American three-toed woodpecker	*Picoides dorsalis*	The Lawrence and Pennington County border, north to Spearfish Creek
Brewer's sparrow	*Spizella breweri*	The sagebrush shrublands of the Bear Lodge Mountains and the Northeastern corner of the Black Hills in Wyoming
Pinyon jay	*Gymnorhinus cyanocephalus*	Most of the species Black Hills NF population is in the southwestern Black Hills in low elevation, dry, sparse ponderosa pine woodlands and scrublands, mixed with grassland.
American beaver	*Castor canadensis*	Perennial low grade streams with aspen and willow riparian areas.
Hoary bat	*Lasiurus cinereus*	Observed across the Black Hills NF during the summer months.
Pacific marten	*Martes caurina*	31 records in the plan area
Fringed myotis	*Myotis thysanodes*	Observed across the Black Hills NF as mist net captures and in caves and mines.
Long-eared myotis	*Myotis evotis*	Observed across the Black Hills NF as mist net captures and in caves and mines.

Long-legged myotis	*Myotis volans*	Observed across the Black Hills NF as mist net captures and in caves and mines.
Little brown bat	*Myotis lucifugus*	Observed across the Black Hills NF as mist net captures and in caves and mines.
Bighorn sheep	*Ovis canadensis*	Isolated herds associated with cliffs and rocky outcrops in ponderosa pine savanna.
Finescale dace	*Chrosomus neogaeus*	Historically, the Finescale Dace has been known to inhabit Spotted Tail Creek, Tent Canyon, Richardson Creek, NFK Cow Creek, and formerly in Hemler Reservior (since drained) and Geis Reservior (breached) in the Black Hills National Forest.
Western bumblebee	*Bombus occidentalis*	17 records. The species is fairly widespread but is undergoing significant rangewide decline.
Cooper's mountainsnail	*Oreohelix cooperi*	Formerly widespread, with more than 600 records in the plan area. The species has since declined significantly, with about 30 colonies remaining, many of which only support small numbers of the species.
Callused vertigo snail	*Vertigo arthuri*	81 records from the plan area in the USFS EDW database.
		Likely Plant Species of Conservation Concern
Sleepy needlegrass	*Achnatherum robustum*	Single occurrence on Cascade Creek of the Southern Black Hills. One 2003 specimen record on BKF Fanny Boles RNA Custer Co.; 9 database occurrences scattered throughout the Black Hills and Bear Lodge.
Southern maidenhair fern	*Adiantum capillus-veneris*	In the Black Hills, it is only known to occur on calcareous substrates along Cascade Creek from J.H. Keith Cascade Falls and J.H Keith Cascade Springs Picnic Areas in Fall River County, South Dakota and ranges in elevation from 3,250 to 3,450 feet. In the Black Hills, southern maidenhair fern and stream orchid occur in scattered colonies at Cascade Springs, a series of six artesian warm springs, and downstream along Cascade Creek in Fall River County, South Dakota. Large populations of these species occur in recreational sites along Cascade Creek that are managed by the Black Hills National Forest. The Black Hills population represents one of the northernmost occurrences of the plant anywhere in its range.
Ragged-leaf false goldfields	*Amauriopsis dissecta*	Three known occurrences in very small geographic area (~1.5 square miles) on the Black Hills NF.

Two-form pussytoes	*Antennaria dimorpha*	Few occurrences in plan area: last observed in plan area 1982. The species has been known to occur within the Black Hills National Forest in Weston County, Wyoming and Custer County, South Dakota.
Groundnut	*Apios americana*	The species is known to occur in the Black Elk Wilderness.
Bright green spleenwort	*Asplenium trichomanes-ramosum*	The species can be found throughout the Black Hills of South Dakota.
American milkvetch	*Astragalus americanus*	The species can be found in Forested riparian zones of the Black Hills National Forest.
Summer milkvetch	*Astragalus hyalinus*	The species was recently documented in southwest SD. Two known occurrences from the southern Black Hills. It can be found in Upper Pass Creek in the northwest corner of Township 6S Range 2E.
Bartramia moss	*Bartramia pomiformis* var. *pomiformis*	The species is known to occur on the Black Hills National Forest west of Mount Rushmore.
Alpine bistort	*Bistorta vivipara*	10 known occurrences in plan area, last observed in plan area 2021. Occurs in high elevations of the central granite core of the Black Hills.
Frenchman's Bluff grapefern	*Botrychium gallicomontanum*	The species can be found in the limestone grasslands of the Black Hills National Forest.
Mingan moonwort	*Botrychium minganense*	In Wyoming, known from the Absaroka, Big Horn and Teton Ranges, the Black Hills, the Ferris Mountains and possibly Sierra Madre Ranges (Big Horn, Carbon, Crook, Fremont, Johnson, Park, Sheridan, Sublette, Teton and Washakie Carbon counties).
Leathery grapefern	*Botrychium multifidum*	Seven of the eight documented occurrences on Black Hills National Forest land are within the Norbeck Wildlife Preserve in a concentrated area (ca. 16 square miles) of the central core on igneous or metamorphic bedrock. One occurrence is in the Bearlodge Mountains (WY) in a narrow, sandstone drainage under a paper birch/hazelnut forest community type. Black Hills occurrences range in elevation from 4,620 to 6,440 feet..
Swamp thread moss	*Bryum uliginosum*	One Black Hills NF specimen record.
Pointed tip mariposa lily	*Calochortus apiculatus*	In Wyoming, known only from the Black Hills (Crook County). Single known location on Black Hills NF (Bearlodge RD).

Fairy slipper	*Calypso bulbosa*	Spruce forests of the high elevation black hills.
Marsh bellflower	*Campanula aparinoides*	It is known to occur in the Black Hills National Forest in the central Black Hills and in Crook County Wyoming.
Foxtail sedge	*Carex alopecoidea*	In the Black Hills *C. alopecoidea* is known from two general areas: the northwestern Black Hills along the South Dakota–Wyoming border, and the Bear Lodge Mountains of Wyoming; Wetland margins of the eastern South Dakota & Black Hills. Occurs from Saskatchewan to Nova Scotia, south to the Black Hills of South Dakota and Wyoming, east from Missouri to New Jersey, also in Tennessee. In Wyoming, known from the Black Hills (Crook County). Foxtail sedge occurs on the Black Hills National Forest in Crook County, Wyoming. It also occurs in South Dakota, where its only western occurrences are in the Black Hills. Within USFS Region 2, *Carex alopecoidea* occurs in the Black Hills region of eastern Wyoming and western South Dakota.
Slenderbeak sedge	*Carex athrostachya*	Single recent collection from Central Black Hills. It may also occur on the Bearlodge Range District in the Wyoming portion of the Black Hills although the specimen reports are suspected to be misidentified. In Dorn 2021 appendix, reported as from Black Hills but no specimens examined (possibly misidentified).
Southwestern showy sedge	*Carex bella*	Black Hills National Forest occurrences are in a concentrated area (within three square miles) in the Black Elk Wilderness. Additional sites have been reported from nearby Custer State Park. Black Hills occurrences are found at high elevations of the granitic central core in cool, moist, shaded white spruce forests often with paper birch and usually associated with granite rock outcrops. Southwestern showy sedge is quite restricted in range and habitat in the Black Hills. There is much that we don't know about the species, as there has been no thorough surveys, no monitoring, and very few and limited studies on the species in the area. One small sub-occurrence reported in the Black Hills area from near the outlet of Sylvan Lake in Sunday Gulch in Custer State Park has not been observed since 1987 and presumably has been lost to hiking and climbing access traffic. No other monitoring data is available for Black Hills populations.
Brownish sedge	*Carex brunnescens*	Few occurrences in Black Elk Peak area. On historical specimen from the Keystone, SD area. Two recent specimens were found on the Bearlodge Ranger District of Wyoming.
Silvery sedge	*Carex canescens*	Can be found in the spruce forest wetlands of the high elevation Black Hills.
Low northern sedge	*Carex concinna*	Approximately 20 occurrences across 3 ranger districts. Uncommonly collected in Black Hills. Occurs from Alaska to Newfoundland, south to Oregon, Colorado, South Dakota and Michigan. In Wyoming, known from the Absaroka and Wind River Ranges, Black Hills and Yellowstone Plateau.
Emory's sedge	*Carex emoryi*	One specimen from the northern Black Hills along North Fork Rapid Creek. In Wyoming in foothills of the Black Hills.

Bronze sedge	*Carex foenea*	Few occurrences in plan area: last observed in plan area 2010.
Limestone meadow sedge	*Carex granularis*	Can be found in the Black Hills of Wyoming in Crook County.
Greater bladder sedge	*Carex intumescens*	Few occurrences in Black Elk Peak area; disjunct in the Black Hills of Wyoming and South Dakota. In Wyoming, known only from the Black Hills (Crook County).
Bristly stalked sedge	*Carex leptalea*	Forested wetlands of the high elevation Black Hills and among isolated trees near Lake Creek in Wyoming.
Western sedge	*Carex occidentalis*	Few occurrences in plan area: last observed in plan area 2021.
Broom sedge	*Carex scoparia*	This species occurs in the Black Hills of Wyoming.
Blunt broom sedge	*Carex tribuloides*	Single 1992 collection from the Black Hills in Wyoming from a springhead wetland.
Sheathed sedge	*Carex vaginata*	The species was discovered in 2009 in the central Black Hills.
Jersey tea	*Ceanothus herbaceus*	Many occurrences in plan area: last observed in plan area 2014.
Squareleaf crestwort	*Chiloscyphus polyanthos*	There is one known occurrence in the Black Hills National Forest.
Broadleaf enchanter's nightshade	*Circaea canadensis* var. *canadensis*	This species is known to occur in the western Black Hills of South Dakota and Wyoming.
Hoary frostweed	*Crocanthemum bicknellii*	Few occurrences in plan area: last observed in plan area 2021.

Mountain cryptantha	*Cryptantha cana*	Few occurrences in plan area: last observed in plan area 2004.
Wild comfrey	*Cynoglossum virginianum* var. *boreale*	Lots of records in Northern Hills and smattering in central.
Mountain lady's slipper	*Cypripedium montanum*	Two Black Hills occurrences are located on the Northern Hills Ranger District (Lawrence County, South Dakota) on mesic soil; one is in a white spruce/twinflower forest community type and the other is in an aspen/bracken fern dominant forest community type with white spruce, paper birch and ponderosa pine). Note: Not yet vouchered for Black Hills, no specimens on SEINet.
Nine anther prairie clover	*Dalea enneandra*	Few occurrences in plan area: last observed in plan area 2009.
California oatgrass	*Danthonia californica*	Can be found in the montane meadows of the Black Hills.
Tufted hairgrass	*Deschampsia cespitosa*	Can be found in the Black Hills wet meadows at higher elevations.
Slimleaf panicgrass	*Dichanthelium linearifolium*	Can be found in the Black Hills of Wyoming.
Fall rosette grass	*Dichanthelium wilcoxianum*	Few specimen reports on BKF in Weston Co WY.
Dicranella moss	*Dicranella cerviculata*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger District)
Schreber's dicranella moss	*Dicranella schreberiana*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger Distric)
Shortleaf dicranum moss	*Dicranum brevifolium*	At least one specimen record on Black Hills NF (Cicero Peak).

Ontario dicranum moss	*Dicranum ontariense*	At least one specimen record on Black Hills NF (Williams Spring Crook Co WY).
Bigelow's tansyaster	*Dieteria bigelovii*	Few occurrences in plan area: last observed in plan area 2010 Crook Co WY.
Longleaf hook moss	*Drepanocladus longifolius*	A couple specimen records on Black Hills NF.
Spinulose woodfern	*Dryopteris carthusiana*	Single 1993 collection from central B Hills. Wyoming occurrences are in the Black Hills (Crook County). Listed in Dorn 2021a appendix as no specimens seen (possibly mis-identified), Dorn could not find any of the Black Hills specimens to examine. Black Hills NF specimen record report at Black Hills NF herbarium in Custer; C. Mayer relocated and documented the occurrence in 2021.
Nylon hedgehog cactus	*Echinocereus viridiflorus*	Few occurrences in plan area: last observed in plan area 2011.
Ovate spikerush	*Eleocharis ovata*	Known to occur in the Black Hills of Wyoming (Crook County).
Beaked spikerush	*Eleocharis rostellata*	In the Black Hills, it is only known to occur on calcareous substrates along Cascade Creek. It occurs on Black Hills National Forest, The Nature Conservancy's Whitney Preserve and private land. On National Forest land, it has been documented from J.H. Keith Cascade Falls and J.H Keith Cascade Springs Picnic Areas in Fall River County, South Dakota and ranges in elevation from 3,250 to 3,450 feet. In both areas plants are associated with warm springs and are likely dependent upon the constant moisture and warmth associated with these springs. Single known occurrence on Cascade Creek. The only currently known population of beaked spikerush in South Dakota is in Fall River County, along Cascade Creek, an area where several other rare plant species occur. The beaked spikerush population is present on lands administered by Black Hills National Forest and on surrounding private lands, including the Whitney Preserve owned and managed by The Nature Conservancy (TNC). Both biotic and abiotic disturbances may play a significant role in the distribution and abundance of beaked spikerush. Natural disturbances such as periodic insect outbreaks and fire may benefit a variety of species by the increased groundwater flow that results from the death of upland trees. However, the limited forest stands in this area suggest that increased groundwater flow from the death of upland trees is not an important factor for this drainage or this population of beaked spikerush.
Diverseglume wildrye	*Elymus diversiglumis*	Last collected in 1969 from woodlands of Black Hills. Specimens from Black Hills NF.

Stream orchid	*Epipactis gigantea*	Only known to occur along Cascade Creek on National Forest land, it has been documented from J.H. Keith Cascade Falls and J.H Keith Cascade Springs Picnic Areas in Fall River County, South Dakota and ranges in elevation from 3,250 to 3,450 feet. In both areas plants are associated with warm springs and are likely dependent upon the constant moisture and warmth associated with these springs. No other warm springs have been documented on the Black Hills National Forest; Single known occurrence on Cascade Creek.
Dwarf scouring rush	*Equisetum scirpoides*	Black Hills riparian forests at higher elevations.
Variegated scouring rush	*Equisetum variegatum*	In Black Hills National Forest, variegated scouring rush is known only from Beaver Gulch in the Bear/Beaver Gulch Botanical Area. 1990 Black Hills NF specimen. A couple Black Hills NF database records.
Hooker's sandwort	*Eremogone hookeri* var. *pinetorum*	Single record in BKF database (09BB01A), but did not find associated specimen; specimen reports of E. *hookeri* on BKF but not positively IDed as var *pinetorum*; one E. *hookeri* specimen at BKF herbarium at SO-appears to be var. *pinetorum*
Bitter fleabane	*Erigeron acris*	Few occurrences in plan area: last observed in plan area 2011.
Buff fleabane	*Erigeron ochroleucus*	Few occurrences in plan area: last observed in plan area 1994.
Tall cottongrass	*Eriophorum angustifolium*	A few BKF database records (USDA USFS 2021a). A few Black Hills NF specimen reports. Only known from the McIntosh Fen Botanical Area.
Fendler's sandmat	*Euphorbia fendleri*	Few occurrences in plan area: last observed in plan area 2018.
Showy prairie gentian	*Eustoma exaltatum* ssp. *russellianum*	Reported in 2003 (Cascade Springs), has been searched for and not relocated since.
Idaho fescue	*Festuca idahoensis*	Few occurrences in plan area: last observed in plan area 2016.
Spotted fritillary	*Fritillaria atropurpurea*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Downy gentian	*Gentiana puberulenta*	Black Hills occurrences are associated with limestone substrates in the transition zone between dry to mesic grassland and forest habitats. Big blue-stem (*Andropogon gerardii*), a tall-grass prairie species, was documented from all sites, and most sites were associated with western snowberry (*Symphoricarpos occidentalis*) and leadplant (*Amorpha canescens*). Sites occur on the eastern edge of the Black Hills, in the vicinities of Rockerville and Blackhawk, South Dakota. Additional sites have been

		reported from private property. Black Hills occurrences range in elevation from 3,960 to 4,480 feet. Prairies of eastern South Dakota & disjunct in Black Hills.
Slender cudweed	*Gnaphalium exilifolium*	Two other records in Black Hills on private land in Lawrence Co (Bulldog Ranch [1946], Yellow Creek [1910]).
Smooth-capsuled dry rock moss	*Grimmia laevigata*	Sheridan lake area collection.
Western oakfern	*Gymnocarpium dryopteris*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Inflated notchwort	*Gymnocolea inflata*	Single specimen report from Black Hills NF (Smith Gulch Fen, located on Mystic Ranger District. Black Hills populations are in moist, rocky slopes, ledges and crevices in open forests, often on granite.
Jerusalem artichoke	*Helianthus tuberosus*	A handful of specimen records from Black Hills NF. A few BKF database records.
Yellow hawkweed	*Hieracium fendleri*	Unknown occurrences in plan area: last observed in plan area 2019.
Hypnum moss	*Hypnum pratense*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger District).
Pinesap	*Hypopitys monotropa*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Sierra rush	*Juncus nevadensis*	Few occurrences in plan area: last observed in plan area 1982, 1983.
Canada lettuce	*Lactuca canadensis*	Multiple specimen reports from throughout the Black Hills NF.
Large pod pinweed	*Lechea intermedia* var. *intermedia*	In Wyoming, known only from the Black Hills (Crook County). 1986 specimen reports on Black Hills NF Crook Co, WY; historic (1965) specimen record from MORU; another historic record (1924) near Black Elk Peak.
Rice cutgrass	*Leersia oryzoides*	Single specimen found on Black Hills NF at FS in Custer; other specimen reports from Black Hills but not on Black Hills NF

Wolf lichen	*Letharia vulpina*	A few specimen records from the Black Hills National Forest.
Broad lipped twayblade	*Listera convallarioides*	There are five known occurrences on the Black Hills National Forest with one site extending onto BLM land. Occurrences are restricted to a 30 square mile area in the northern Black Hills, south of Lead, South Dakota. Black Hills occurrences are in saturated soil conditions adjacent to creeks and springs, in white spruce (*Picea glauca*) forests and range in elevation from 5,040 to 6,100 feet.; Few occurrences in springhead wetlands of northern Black Hills.
Bulbus woodland star	*Lithophragma glabrum*	Few occurrences in plan area: last observed in plan area 2010.
Lung lichen	*Lobaria pulmonaria*	Few occurrences in plan area: last observed in plan area 2005.
Fernleaf biscuitroot	*Lomatium dissectum*	Few occurrences in plan area: last observed in plan area 2020.
Hairy woodrush	*Luzula acuminata* var. *acuminata*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Small flowered woodrush	*Luzula parviflora*	This species can be found in the northern Black Hills.
Stiff clubmoss	*Lycopodium annotinum*	In the Black Hills *L. annotinum* occurs in moist microhabitats within remnant boreal white spruce and paper birch/hazelnut communities. Two occurrences are co-located with *Lycopodium complanatum*. Black Hills occurrences range in elevation from 4,900 to 6,300 feet. Two additional historic reports have not been relocated. Few occurrences in northern Black Hills. Species occur in a dense colony in the Upper Sand Creek Botanical Area, Crook County, Wyoming; and smaller, separate populations of each species occur in Lawrence County, South Dakota.
Ground cedar	*Lycopodium complanatum*	Occurrences are located in the northern Black Hills on shaded, north-facing slopes. Sites occurs only in scattered patches characteristic of decline in extent, brown dried stems often present. *Lycopodium complanatum* is found only in the Black Hills National Forest in Region 2. The boreal spruce habitats ground cedar and stiff clubmoss occupy in the Black Hills are disjunct from the main distribution of white spruce to the north and in the northern Rocky Mountains These remnant boreal forests occur primarily in the northern Black Hills on north facing slopes and draws with paper birch (*Betula papyrifera*) as a common seral or dominant canopy component.
Tree ground pine	*Lycopodium dendroideum*	Presence in the plan area confirmed by the USFS Region 2 Botanist.

Northern bugleweed	*Lycopus uniflorus*	There are 14 known occurrences in the plan area. The majority are within the Central Black Hills and granite core. There is one occurrence in the Northern Bearlodge Mountains.
Onion grass	*Melica bulbosa*	1 specimen record occurrences in plan area: last observed in plan area 2014.
Nodding microseris	*Microseris nutans*	Few occurrences in plan area: last observed in plan area 2010.
Five stamen miterwort	*Mitella pentandra*	Documented occurrences are within a 10 square mile area in the vicinity of Tinton, South Dakota. Black Hills sites occur in white spruce (*Picea glauca*) and paper birch/hazelnut (*Betula papyrifera*/*Corylus cornuta*) communities along small perennial and intermittent streams. Plants occur in mossy, moist to saturated, low areas. Some sites are associated with seeps. Black Hills occurrences range in elevation from 5,280 to 6,280 feet; Few occurrences in n Black Hills.
Spring forget-me-not	*Myosotis verna*	This species is known to occur in the Black Hills of Wyoming.
One flowered broomrape	*Orobanche uniflora*	Rarely collected in the northeastern Black Hills.
Alpine mountain sorrel	*Oxyria digyna*	Black Hills National Forest occurrences are located in the granitic central core of the Black Hills and are restricted to a two square mile area within the Black Elk Wilderness. Additional sites have also been reported from Custer State Park. In the Black Hills *O. digy*na grows on coarse-textured soils in steep rocky gullies near granite rock outcrops. It often occurs with *Carex bella* and *Viola selkirkii*. Black Hills occurrences range in elevation from 6,000 to 7,240 feet; Localized in Black Elk Peak area of Black Hills.
Curled hook moss	*Palustriella falcata*	At least one of two specimen records on Black Hills NF.
Alpine notchleaf moss	*Paraleucobryum enerve*	Single 2008 specimen record in plan area.
Marsh grass of Parnassus	*Parnassia palustris*	Occurrence in fen of north-central South Dakota area of the Black Hills NF.
Giant lousewort	*Pedicularis procera*	Presence in the plan area confirmed by the USFS Region 2 Botanist.

Wax leaf penstemon	*Penstemon nitidus*	1 specimen record occurrences in plan area: last observed in plan area 1990.
Pennsylvania smartweed	*Persicaria pensylvanica*	A few Black Hills specimen reports, at least one (1984) in Lawrence County is on the Black Hills NF.
Arrowleaf sweet coltsfoot	*Petasites frigidus* var. *sagittatus*	In the Black Hills it occurs in moist to saturated wetland areas along drainages and seeps ranging from full sun to shady white spruce (*Picea glauca*) forests often with paper birch (*Betula papyrifera*) or quaking aspen (*Populus tremuloides*). Black Hills occurrences range in elevation from 5,120 to 6,660 feet. Its scattered distribution in the Rocky Mountains and Black Hills is likely the result of the geographic isolation of wetland habitats in these regions during the current inter-glacial drying trend. The currently known metapopulation of arrowleaf sweet coltsfoot in the Black Hills is comprised of three populations in Lawrence County and one in Pennington County. Given the relatively close proximity of the South Dakota populations, it is likely that genetic exchange occurs between populations in the state. It is not known if there is any genetic exchange with other locations in the region, but it is probably limited since the nearest populations to the Black Hills are over 100 miles distant. In the Black Hills, Wyoming, and Colorado, arrowleaf sweet coltsfoot approaches the southern end of its range, and generally occurs as scattered, disjunct populations, although it may be locally abundant.
Threadleaf phacelia	*Phacelia linearis*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Little fountain apple moss	*Philonotis fontana* var. *pumila*	At least one specimen record on Black Hills NF.
American lopseed	*Phryma leptostachya*	In Wyoming, known only from the Black Hills.
Virginia groundcherry	*Physalis virginiana*	In Wyoming, known from the Black Hills.
Great Plains bladderpod	*Physaria arenosa* ssp. *argillosa*	Of 36 known occurrences of *L. arenosa* var. *argillosa*, at least five are on USFS National Forest System lands. Several historical occurrences with imprecise location information occur in close proximity to USFS National Forest System lands (e.g. Black Hills National Forest (South Dakota). A couple specimen records from Black Hills NF.
Lodgepole pine	*Pinus contorta*	Known from a few locations in Lawrence County (BHSU Herbarium has 39 vouchers, RM has 6); Reported elevations range from 5,640-5,880 feet; Usually occurs in mixed conifer forest with dry soils; scattered trees elsewhere in the northern B Hills.

Limber pine	*Pinus flexilis*	In the Black Hills *P. flexilis* is known to occur naturally within a two square mile area of the Black Elk Wilderness (Black Elk Peak area) and Custer State Park; sites range in elevation from 6,400 to 7,100 feet and are characterized by large granite outcrops, with *P. flexili*s often growing on north-facing, open rocky ridges, or partially shaded upper slopes with white spruce (*Picea glauca*), ponderosa pine, and common juniper. As part of the 2017 Limber Pine Restoration Project, additional seedlings have been planted in the Norbeck Wildlife Preserve one mile northwest of Black Elk Peak at an elevation of 5,400 to 6,000 feet.
Mountain ricegrass	*Piptatherum pungens*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Greater featherwort	*Plagiochila asplenioides*	One specimen record from the Black Hills National Forest (1986).
Scentbottle	*Platanthera dilatata*	Rare in wetland habitats of the n Black Hills.
Whorled milkwort	*Polygala verticillata*	Listed in Dorn 2021a; historic specimen (1908) report from Black Hills near Pringle, but location info not exact - can't confirm if on Black Hills NF. There is also a 1981 specimen report from the plan area.
Climbing false buckwheat	*Polygonum scandens*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Jensen's polytrichum moss	*Polytrichum jensenii*	Known to occur on the Black Hills NF at Smith Gulch Fen (located on Mystic Ranger District) (and possibly other locations).
Platte River cinquefoil	*Potentilla plattensis*	Historic specimen report from Black Hills (1914); more recent BKF report and specimens from McIntosh Fen BA (located on Mystic Ranger District) (2014). One specimen is at the Forest Service office in Custer, and one was deposited at BHC Herbarium but is not currently on their online database); in Black Hills NF plant database 14SO05A.
Rough rattlesnake root	*Prenanthes aspera*	Few occurrences in plan area, but observed in plan area
Purple rattlesnake root	*Prenanthes racemosa*	Known from about 50 locations in Crook, Custer, Lawrence, Meade, and Pennington Counties; Reported elevations range from 4,080-6,320 feet; Usually occurs in mixed hardwood, riparian vegetation; Numerous herbarium vouchers from the Black Hills (BHSU has 27, RM has 6).

Drops-of-gold	*Prosartes hookeri*	ca. 104 reported occurrences in Northern Black Hills and Bearlodge (however, many not verified by voucher specimens); Known occurrences range in elevation from 4400 to 6200 ft. and occur on open to shaded sites; Most occurrences are associated with paper birch/beaked hazelnut community, often mixed with quaking aspen).
Intense light and dark lichen	*Pseudevernia intensa*	2 Black Hills NF locations - 1 in Black Elk Wilderness (Peter Nelson?) and one on NH district.
Bluebunch wheatgrass	*Pseudoroegneria spicata*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Cartilage lichen	*Ramalina sinensis*	Collected from Ward Draw in Lawrence County, and the other is T.3N., R1E, NW ¼ Section 36, also Lawrence County.
Felted leafy moss	*Rhizomnium pseudopunctatum*	Documented on Black Hills NF.
Ontario rhodobryum moss	*Rhodobryum ontariense*	A couple specimen records on Black Hills NF.
Dark beaked moss	*Rhynchostegium serrulatum*	1 specimen record occurrences in plan area.
Syed's bryum moss	*Rosulabryum laevifilum*	Documented on Black Hills NF.
Sageleaf willow	*Salix candida*	Two known occurrences, both in the central Black Hills on the Mystic Ranger District of the Black Hills National Forest. The single natural occurrence is located at McIntosh Fen Botanical Area (west of Deerfield, SD on Mystic Ranger District) at an elevation of 6,000 feet; a second experimental site was planted in 2007 near Heely Creek at an elevation of 6,300 feet.
Greenleaf willow	*Salix lasiandra* var. *caudata*	*S. lasiandra* var. *caudata* is considered a facultative wetland species in the Black Hills. There are three known occurrences on the Black Hills National Forest all of which occur on floodplains or stream banks. Black Hills occurrences range in elevation from 4,800 to 5,620 feet. One additional historic report has not been relocated.
Shining willow	*Salix lucida*	*S. lucida* is considered a facultative wetland species in the Black Hills. There is only one documented occurrence on the Black Hills National Forest. An additional historical (1913) location near Deadwood, SD has not been relocated and is likely extirpated. The single central Black Hills site has two individuals and is in a dense willow (*Salix* spp.) shrubland floodplain along Rapid Creek at an elevation of 5,140 feet; Single recent collection from cent Black Hills.

Autumn willow	*Salix serissima*	There are five natural occurrences documented on the Black Hills National Forest and one experimental planting. These occurrences are located in the central to northern Black Hills and are associated with fens and wet meadows, often dominated by sedges and other willow species. Saturated, organic soils of n Black Hills. In the Black Hills National Forest, a large population of autumn willow occurs at McIntosh Fen (located in Mystic Ranger District), a rare, calcareous fen meadow complex in Pennington County, and a much smaller population occurs on Middle Boxelder Creek in Lawrence County. Both populations occur in association with specific geologic and hydrologic conditions that have resulted in an elevated water table, fen-like habitats and saturated organic substrates. These habitats are extremely rare in the Black Hills.
Bloodroot	*Sanguinaria canadensis*	Black Hills occurrences are limited to the northeast portion of the Forest, from the east side of Spearfish Canyon to west of Tilford. Additional sites have been reported from private land. Black Hills occurrences range in elevation from 3,800 to 5,000 feet
Nodding saxifrage	*Saxifraga cernua*	Moist sites at higher elevations of B Hills.
Alberta saxifrage	*Saxifraga occidentalis*	Few collections from n Black Hills.
Heath Earwort	*Scapania irrigua*	Single specimen report from BKF (Smith Gulch Fen, located on Mystic Ranger District).
Woolgrass	*Scirpus cyperinus*	Presence in the plan area confirmed by the USFS Region 2 Botanist.
Northern selaginella	*Selaginella rupestris*	Known from about 40 locations in Crook, Custer, Fall River, Lawrence, Meade, Pennington, and Weston Counties; Most occurrences are on the Hell Canyon District in Custer County; Reported elevations range from 4,480-6,040 feet; Usually occurs in ponderosa pine forest, grasslands or the transition between the two; Most likely under-reported due to perceived abundance and small stature.
Three nerve goldenrod	*Solidago velutina*	Few occurrences in plan area: last observed in plan area 2007.
Broadfruit bur-reed	*Sparganium eurycarpum*	In Wyoming, known from the Black Hills. One specimen record found on BKF (Crook Co, 1986); 3 records in BKF database (not sure if there are specimens).
Narrowleaf peatmoss	*Sphagnum angustifolium*	In the Black Hills S. angustifolium is currently reported from a single unconfirmed occurrence in the Rochford Cemetery Fen on the Mystic Ranger District at an elevation of 5,500 feet. (USDA USFS 2018i) but this was not confirmed as recently as 2021.

Northern peatmoss	*Sphagnum capillifolium*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger District)
Flat-top bogmoss	*Sphagnum fallax*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger District)
Brown peatmoss	*Sphagnum fuscum*	Known from few localities in the Black Hills (including Smith Gulch Fen, located on Mystic Ranger District)
Prairie dropseed	*Sporobolus heterolepis*	Many occurrences in plan area: last observed in plan area 2012.
Sheathed pondweed	*Stuckenia vaginata*	Last collected on Black Hills National Forest in the year 2000.
Hairy navel lichen	*Umbilicaria hirsuta*	One specimen report from Black Hills NF on the Northern Hills District under old ponderosa pine trees on south facing forest, on rock.
Cranberry	*Vaccinium macrocarpon*	Recently discovered in Black Hills acid fen.
Thinleaf huckleberry	*Vaccinium membranaceum*	Restricted to forests in Lead/Deadwood area and Bearlodge Mountains.
Small white violet	*Viola macloskeyi*	Plan Area-specific information not available (sources checked include.
Selkirk's violet	*Viola selkirkii*	Black Hills occurrences are known from Black Hills National Forest, Custer State Park and Mt. Rushmore National Memorial and are restricted to a concentrated area (ca. 36 square miles) of the central core on igneous or metamorphic bedrock; All documented occurrences on the Forest are located within the Black Elk Wilderness and/or the Norbeck Wildlife Preserve. Black Hills occurrences range in elevation from 5,200 to 7,000 feet. Moist forests at higher elevations of the B Hills. In the Black Hills, the species is restricted to spruce-dominated forests in cold, shady ravines from 5,400 to 7,000 ft (1,645 to 2,135 m) elevation on soils derived from granitic parent material. Moist, mossy mats and benches, rocky slopes in cool, shaded ravines, plus cold air drainages and cliff bases. There are currently 10 known occurrences of great spurred violet in Black Hills National Forest administered lands.
Warnstorfia moss	*Warnstorfia pseudostraminea*	Known from Black Hills NF Smith Gulch Fen (located on Mystic Ranger District) (and possibly other locations).

Chapter 3. Ecological Conditions Assessed by the Assessment of Key Ecological Characteristics, status of those conditions for At-Risk species, and species (or groups of species).

After determining which species are At-Risk in the plan area and determining what ecological conditions are needed for those species, the 2012 Planning Rule requires the USFS to assess the ecological conditions present in the plan area in the context of those species and their needs. Ecological conditions for each At-Risk species are summarized in Table 3. This meets the requirements for parts 3 and 5 of 2012 Planning Rule Section 12.55.

Overall ecological conditions in the plan area are addressed in the *Forested Ecosystems* and the *Non-forested Ecosystems* assessments (USDA Forest Service 2023c, and USDA Forest Service 2023d) a For the At-Risk species assessment, relevant sections are summarized from both those assessments, along with the At-Risk species that require that system.

Note that all ecosystems in the plan area may be used as foraging habitat by Northern long-eared bat and by American kestrel but may not be a limiting factor to those species, as the limiting issues are often related to nesting/roosting habitat, disease, or other issues.

Ponderosa Pine

The current ecological integrity of ponderosa pine is compromised by significant change in the type, size, and severity of ecological disturbances and by the current forest structure. Low resilience of current forest conditions will interact with climate change and current forest management practices to maintain the current simplified forest structure.

The ecological integrity of the ponderosa pine ecosystem is low and will likely continue to be low in the future, assuming even-aged vegetation management continues to be the dominant practice, given the following:

- The extent of mature ponderosa pine on the Black Hills National Forest has recently been declining while nonstocked and immature stand areas have been increasing. If these trends continue and uncharacteristic fire becomes more widespread as a result of climate change, more areas may be converted to nonstocked.
- Forest structure across the landscape has been simplified and is not as diverse as the historical structure. Patch sizes are larger and more homogenous and tree density is higher but composed of smaller trees. Current forest conditions are more uniform and continuous, with fewer gaps and more even spacing, increasing the likelihood of crown fire. This is dissimilar to the uneven-aged and spatially heterogeneous forest structure found historically. These conditions compromise forest resilience and delivery of ecosystem services. There is a clear decline in late-successional habitat resulting from the recent mountain pine beetle mortality and fire. Additionally, timber management, mountain pine beetle activity, fire, tornados, or a combination of these have converted more than 150,000 acres of moderately closed and closed stands to non-stocked areas and open stand conditions.

- Regeneration is generally prolific (when seed sources are present and competing vegetation is not a limiting factor), but high intensity fires and climate change will likely lead to more areas that do not regenerate and considerably more variable regeneration.
- Abundance of snags and down wood appear to be similar to what likely occurred historically in these forests. However, due to the lack of low-intensity fire, these snags fall quickly in comparison to the snags of fire-hardened large trees.

At-Risk species use of Ponderosa Pine woodlands

- Sleepy needlegrass (*Achnatherum robustum*)
- Monarch butterfly (*Danaus plexippus*)
- American kestrel (*Falco sparverius*) (along edges only, or as cavity nesters)
- Black-backed woodpecker (*Picoides arcticus*)
- American three-toed woodpecker (*Picoides dorsalis*) (in early successional areas with copious large woody debris, or in old growth as cavity nesters in large trees)
- Leathery grapefern (*Botrychium multifidum*)
- Summer milkvetch (*Astragalus hyalinus*)
- Pointed tip mariposa lily (*Calochortus apiculatus*)
- Western sedge (*Carex occidentalis*)
- Hoary frostweed (*Crocanthemum bicknellii*)
- Nine anther prairie clover (*Dalea enneandra*)
- Slimleaf panicgrass (*Dichanthelium linearifolium*) (often in dry, stony or sandy sites).
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Hooker's sandwort (*Eremogone hookeri* var. *pinetorum*)
- Buff fleabane (*Erigeron ochroleucus*)
- Idaho fescue (*Festuca idahoensis*)
- Yellow hawkweed (*Hieracium fendleri*)
- Large pod pinweed; (*Lechea intermedia* var. *intermedia*)
- Wolf lichen (*Letharia vulpina*)
- Fernleaf biscuitroot (*Lomatium dissectum*)
- Nodding microseris (*Microseris nutans*)
- Spring forget-me-not (*Myosotis verna*)
- Purple rattlesnake root; (*Prenanthes racemose*)
- Bluebunch wheatgrass (*Pseudoroegneria spicata*)
- Cartilage lichen; (*Ramalina sinensis*)
- Northern selaginella; (*Selaginella rupestris*)
- Hairy navel lichen (*Umbilicaria hirsuta*)

- Bighorn sheep (*Ovis canadensis*)
- Northern long-eared bat (*Myotis septentrionalis)*
- Little brown bat *(Myotis lucifugus)*
- Fringed myotis *(Myotis thysanodes)*
- Long-legged myotis *(Myotis volans)*
- Hoary bat *(Lasiurus cinereus)*
- Northern goshawk (*Accipiter gentilis*)
- Townsend's big-eared bat *(Corynorthinus townsendii)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors for Ponderosa Pine Woodlands

Risk Factors	Species Potentially Impacted
Climate change	All species that require this habitat type.
Fire, exacerbated by even age stand structure	American kestrel (*Falco sparverius*), wolf lichen (*Letharia vulpina*); Northern goshawk (*Accipiter gentilis*), northern long-eared bat (*Myotis septentrionalis*), little brown bat *(Myotis lucifugus)*, hoary bat *(Lasiurus cinereus),* long-eared myotis *(Myotis evotis)*
Fire exclusion leading to open areas filling in with other woody species	Bighorn sheep (*Ovis canadensis*); American kestrel (*Falco sparverius*), sleepy needlegrass (*Achnatherum robustum,*) *s*ummer milkvetch (*Astragalus hyalinus*), pointed tip mariposa lily (*Calochortus apiculatus*), ragged-leaf false goldfields (*Amauriopsis dissecta*), fernleaf biscuitroot (*Lomatium dissectum*)
Timber harvest	Black-backed woodpecker (*Picoides arcticus*), northern goshawk (*Accipiter gentilis*), Northern long-eared bat (*Myotis septentrionalis*), little brown bat *(Myotis lucifugus)*, hoary bat *(Lasiurus cinereus),* long-legged myotis *Myotis volans,* fringed myotis *Myotis lucifugus,* long-eared myotis *(Myotis evotis)*
Pine beetle (especially impacting older trees)	Northern goshawk (*Accipiter gentilis*)
Grazing and trampling impacts to understory	Pointed tip mariposa lily (*Calochortus apiculatus*), slimleaf panicgrass: slim-leaf witchgrass (*Dichanthelium linearifolium*).
Off-road vehicle use	Large pod pinweed; narrowleaf pinweed (*Lechea intermedia* var. *intermedia*). Nearly every plant species in this habitat type.

White Spruce

Pure Spruce Areas

Areas of mostly pure spruce, where it existed historically on cool mesic sites. These pure spruce stands have always been dominated by spruce with varying, disturbance driven levels of ponderosa pine, aspen, and other hardwoods as minor components. These forest types occupy a small niche on the moister, northern aspects, and are dominant near riparian areas. These areas tend to have longer fire return intervals and a greater presence of stand-replacing

fire and are therefore be less impacted by fire exclusion. The white spruce on the Black Hills appears to be in good health with mortality that is in the realm of natural or expected mortality levels. Climate change compromises the status of white spruce ecosystems and therefore the future trend may be toward moderate ecological integrity.

Most of the white spruce ecosystem on the Black Hills is in the large diameter stand-size class and 60-100 years old. There are many small trees and suggest that white spruce regeneration and recruitment is occurring. There are enough seed sources and regeneration that this species is capable of sustaining itself.

Current data indicates an abundance of snags in the white spruce forest type. Given fire exclusion and the very limited management that is done in white spruce, down woody material should be at near-natural levels or higher.

White spruce, with its isolated population in the Black Hills, is likely more vulnerable to changes in climate. It is not well-adapted to drought conditions and more widespread fire may reduce the prevalence of this species on the landscape. Even so, the Black Hills may continue to support refugia population of this species, particularly in colder, wetter locations, assuming fires do not reach these areas.

White spruce provides habitat diversity in a landscape dominated by ponderosa pine. Late-successional white spruce with its associated structural complexity (i.e., increased understory vegetation, downed woody debris, and snags), provides habitat for several Forest species and many rare plants in the Black Hills. These and other ecosystem services will likely continue to be provided in the future given the current and likely future ecosystem integrity of white spruce on the Black Hills.

At-Risk Species use of White Spruce Areas

- Bartramia moss (*Bartramia pomiformis* var. *pomiformis*)
- Leathery grapefern (*Botrychium multifidum*)
- American milkvetch (*Astragalus americanus*)
- American dipper (*Cinclus mexicanus*), streams and riparian areas in this type.
- Black-backed woodpecker (*Picoides arcticus*)
- American kestrel (*Falco sparverius*), along edges.
- American three-toed woodpecker (*Picoides dorsalis*) (in early successional areas with copious large woody debris, or in old growth as cavity nesters in large trees)
- Pacific marten (*Martes caurina*)
- Tricolored bat (*Perimyotis subflavus)*
- Little brown bat *(Myotis lucifugus)*
- Groundnut (*Apios americana*)
- Fairy slipper (*Calypso bulbosa*)
- Slenderbeak sedge (*Carex athrostachya*)
- Southwestern showy sedge (*Carex bella*)
- Silvery sedge (*Carex canescens*) (acidic wetlands within this type)

- Low northern sedge (*Carex concinna*)(wetlands within this type)
- Greater bladder sedge (*Carex intumescens*)
- Bristly stalked sedge (*Carex leptalea*)
- Broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*)
- Mountain lady's slipper (*Cypripedium montanum*)
- Shortleaf dicranum moss (*Dicranum brevifolium*)
- Diverseglume wildrye (*Elymus diversiglumis*)
- Dwarf scouring rush (*Equisetum scirpoides*)(riparian areas within this type)
- Hooker's sandwort (*Eremogone hookeri* var. *pinetorum*)
- Pinesap (Hypopitys monotropa)
- Broad lipped twayblade (*Listera convallarioides*)(saturated soils in this type)
- Lung lichen (Lobaria pulmonaria)
- Small flowered woodrush (*Luzula parviflora*)
- Stiff clubmoss (*Lycopodium annotinum*)
- Ground cedar (*Lycopodium complanatum*)
- Nodding microseris (*Microseris nutans*)
- Limber pine (*Pinus flexilis*)
- Drops-of-gold (*Prosartes hookeri*)
- Intense light and dark lichen (*Pseudevernia intensa*)
- Cartilage lichen (*Ramalina sinensis*)
- Nodding saxifrage (*Saxifraga cernua*)
- Thinleaf huckleberry (*Vaccinium membranaceum*)
- Selkirk's violet (*Viola selkirkii*)(granitic soils)
- Hoary bat *(Lasiurus cinereus)*
- Long-eared myotis *(Myotis evotis)*
- Alpine bistort (*Bistorta vivipara*)
- Five stamen miterwort (*Mitella pentandra*)
- Alpine mountain sorrel (*Oxyria digyna*)

Risk Factors	Species Potentially Impacted
Canopy loss due to harvest	Groundnut (*Apios americana*), American milkvetch (*Astragalus americanus*), fairy slipper (*Calypso bulbosa*), broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*), stiff clubmoss (*Lycopodium annotinum*), ground cedar; trailing clubmoss (*Lycopodium complanatum*), lesser roundleaved orchid (*Platanthera orbiculate*), drops-of-gold (*Prosartes hookeri*), intense light and dark lichen (*Pseudevernia intensa*), cartilage lichen (*Ramalina sinensis*), nodding saxifrage (*Saxifraga cernua*), black-backed woodpecker *(Picoides arcticus)*, Pacific marten (*Martes caurina*), hoary bat (*Lasiurus cinereus),* tricolored bat *(Perimyotis subflavus),* little brown bat *(Myotis lucifugus),* long-eared myotis *(Myotis evotis)*
Severe wildfire	All dependent species
Climate change	All dependent species

Mixed-Conifer Areas

Many mixed-conifer areas have succeeded to spruce due to fire exclusion occur on gentler slopes and drier sites. These stands currently exhibit moderate and declining ecological integrity.

Historically, mixed-conifer areas were a mix of spruce, pine, and other species such as aspen and paper birch. Mixed-conifer areas were likely more prevalent but have succeeded to spruce in the absence of fire. Expansion likely occurred more frequently on gentler slopes and drier sites as these sites would have experienced more frequent fire and this would have favored pine and other species over white spruce, maintaining the areas as mixed-conifer. Fire exclusion has likely led to additional larger, more contiguous areas of white spruce. Recent expansion may also occur when spruce increases in abundance after pine harvest or pine mortality due to mountain pine beetle in mixed pine/spruce stands (USDA Forest Service 2015)

At-Risk Species use of Mixed-Conifer

- American kestrel (*Falco sparverius*), along edges
- Black-backed woodpecker (*Picoides arcticus*)
- American three-toed woodpecker (*Picoides dorsalis*) (in early successional areas with copious large woody debris, or in old growth as cavity nesters in large trees)
- Northern goshawk (*Accipiter gentalis*)
- Pacific marten (*Martes caurina*)
- Tricolored bat (*Perimyotis subflavus)*
- Hoary bat (*Lasiurus cinereus)*
- Little brown bat (*Myotis lucifugus)*
- Long-eared myotis (*Myotis evotis)*
- Ragged-leaf false goldfields (*Amauriopsis dissecta*)

- Alpine bistort (*Bistorta vivipara*)
- Leathery grapefern (*Botrychium multifidum*)
- Fairy slipper (*Calypso bulbosa*)
- Silvery sedge (*Carex canescens*)(acidic wetlands within this type)
- Greater bladder sedge (*Carex intumescens*)
- Sheathed sedge (*Carex vaginata*)
- Broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*)
- Mountain lady's slipper (*Cypripedium montanum*)
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Diverseglume wildrye (*Elymus diversiglumis*)
- Dwarf scouring rush (*Equisetum scirpoides*)(riparian areas within this type)
- Buff fleabane (*Erigeron ochroleucus*)
- Pinesap (Hypopitys monotropa)
- Lung lichen (Lobaria pulmonaria)
- Small flowered woodrush (*Luzula parviflora*)
- Stiff clubmoss (*Lycopodium annotinum*)
- Ground cedar (*Lycopodium complanatum*)
- Nodding microseris (*Microseris nutans*)
- Five stamen miterwort (*Mitella pentandra*)
- Alpine mountain sorrel (*Oxyria digyna*)
- Lodgepole pine (*Pinus contorta*)
- Limber pine (*Pinus flexilis*)
- Drops-of-gold (*Prosartes hookeri*)
- Intense light and dark lichen (*Pseudevernia intensa*)
- Thinleaf huckleberry (*Vaccinium membranaceum*)

Risk Factors	Species Potentially Impacted
Climate change, especially if trending towards drier conditions	All species that depend exclusively upon this habitat
Canopy loss, loss of shaded areas in understory (regardless of the cause of such condition).	American trailplant (*Adenocaulon bicolor*), leathery grapefern (*Botrychium multifidum*), stiff clubmoss (*Lycopodium annotinum*), five stamen miterwort (*Mitella pentandra*), drops-of-gold (*Prosartes hookeri*), intense light and dark lichen (*Pseudevernia intensa*). All other shade-tolerant/direct sunlight intolerant plant and invertebrate species. Black-backed woodpecker (Picoides arcticus), Pacific marten (*Martes caurina*), hoary bat (Lasiurus cinereus), tricolored bat (*Perimyotis sublfavus)*, little brown bat *(Myotis lucifugus),* long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
Extreme wildfire	All dependent species
Fire exclusion	Diverseglume wildrye (*Elymus diversiglumis*), ground cedar (*Lycopodium complanatum*), intense light and dark lichen (*Pseudevernia intensa*)

Aspen

The ecological integrity of the aspen ecosystem on the Forest is moderate. Integrity is declining and will likely be low in the future as summarized here.

Fire exclusion has reduced disturbance in this type, affecting the vigor of existing stands as a consequence of uninterrupted forest succession. Aspen restoration treatments occur at a small scale and are not contributing significantly to the ecological integrity of aspen; the pace of aspen loss to succession is greater than the pace of restoration at the spatial extent of the Forest. Prescribed fire benefits aspen ecosystems and increases ecological integrity of aspen. However, as described in the fire and fuels assessment, prescribed fire is not implemented at a pace and scale to have a broad impact.

Browsing from livestock and wild ungulates can be a stressor in the aspen ecosystem and fencing and other similar measures to prevent this browsing are difficult to do at large scales, with browsing also being an important infection route for canker fungi. However, as stated in the Rangeland Assessment, the Forest works with permittees to achieve proper use of the forage resource and maintain harmony with other resources and uses. Working with grazing permittees to reduce stressors on aspen saplings could and should be addressed during annual permittee grazing meetings. The reduction in beavers in the riparian aspen forests on the Black Hills is a stressor given beavers stimulate aspen regeneration and restore ecosystem processes.

Under a changing climate, there will be both beneficial and detrimental effects to aspen on the Black Hills. Aspen resprouts after fire and will likely benefit if fire becomes more prevalent in the future. But the species is also vulnerable to moisture stress and severe drought conditions, which are tied to higher aspen mortality. Aspen in more xeric sites is particularly vulnerable. Increases in temperature may be challenging for aspen as well.

At-Risk Species Use of Aspen

- Northern long-eared bat (*Myotis septentrionalis*)
- Hoary bat *(Lasiurus cinereus)*
- Little brown bat *(Myotis lucifugus)*
- Tricolored bat (*Perimyotis subflavus)*
- Ruffed grouse (*Bonasa umbellus*)
- American beaver (*Castor canadensis*)
- American kestrel (*Falco sparverius*), along edges
- American three-toed woodpecker (*Picoides dorsalis*) (in early successional areas with copious large woody debris, or in old growth as cavity nesters in large trees)

- Western sedge (*Carex occidentalis*)
- Groundnut (*Apios americana*)
- Slenderbeak sedge (*Carex athrostachya*)
- Mountain lady's slipper (*Cypripedium montanum*)
- Giant lousewort (*Pedicularis procera*)
- Arrowleaf sweet coltsfoot; (*Petasites frigidus* var. *sagittatus*)
- Drops-of-gold (*Prosartes hookeri*)
- Pointed tip mariposa lily (*Calochortus apiculatus*)
- Fernleaf biscuitroot (*Lomatium dissectum)*
- Thinleaf huckleberry (*Vaccinium membranaceum*)

Risk Factors	Species Potentially Impacted
Stand replacement by conifer species	All species that depend upon this habitat
Large ungulate browsing	All Aspen dependent species
Beaver population decline	All Aspen dependent species

Bur Oak

The ecological integrity of the bur oak ecosystem on the Forest is high and will likely continue to be high in the future. Data indicate no issue with regeneration and recruitment and there is no concern about significant impacts from insects or disease. Trees appear to be of sufficient size for mast production. It's well-adapted to fire, with its thick bark and ability to re-sprout after fire, and tolerant to drought, which will help maintain the species on the Forest even under a changing climate. Given this, we anticipate no issues with maintaining bur oak on the landscape and maintaining ecosystem services it provides, such wildlife habitat and forage and cultural value. In fact, it may have an advantage under a changing climate.

At-Risk Species use of Bur Oak

- Dark beaked moss (*Rhynchostegium serrulatum*)
- Bloodroot (*Sanguinaria canadensis*)
- Tricolored bat *(Perimyotis subflavus)*
- Little brown bat *(Myotis lucifugus)*
- Northern long-eared bat *(Myotis septentrionalis)*
- Hoary bat *(Lasiurus cinereus)*
- Fringed myotis *(Myotis lucifugus)*
- Fernleaf biscuitroot (*Lomatium dissectum*)
- Small flowered woodrush (*Luzula parviflora)*
- Spring forget-me-not (*Myosotis verna*)

- Northern sanicle (*Sanicula graveloens*)

Risk Factors	Species Potentially Impacted
Conifer encroachment	Bloodroot (Sanguinaria canadensis)
Invasive plants	Bloodroot (Sanguinaria canadensis)

Paper birch (Betula papyrifera)

Outside of quaking aspen and bur oak, paper birch is the most common hardwood tree found in the Black Hills. It is more common in the northern parts of the Black Hills, with some scattered trees and small stands in the southern part of the Forest.

While paper birch is sometimes found in ponderosa pine and other forest types, paper birch/beaked hazel forest is a unique, montane dry riparian type found at upper elevations on the forest. These forests tend to have dense canopies dominated by paper birch. They occur in drainage bottoms (with or without streams) and on slopes with northern aspects. Emergent white spruce and ponderosa pine may be present in these areas. Shrub diversity can be high, but beaked hazel often dominates the shrub layer.

The paper birch/beaked hazel ecosystem provides ecological conditions that support several at-risk plant species. This community type is ranked as globally imperiled and critically imperiled in Wyoming.

Assessments indicate that suitability for paper birch will decrease, or severely decrease with a changing climate. It is likely moisture limited in the Black Hills. Post-fire paper birch recruitment may be negatively impacted by warming temperatures and increased fire frequency combined with warming temperatures may decrease birch abundance.

Paper birch in the Black Hills exists as a small, disconnected population in the southernmost portion of its central U.S. range, suggesting that it would be difficult for the species to expand to adjacent locations with a changing climate.

Paper birch is vulnerable to root rotting pathogens making trees susceptible to toppling and reducing growth. However, mortality of the overstory trees is well within expectations; thus root disease is helping with the natural thinning of the relatively dense overstory. However, negative effects from pathogens such as these may increase with climate change where trees are already drought stressed.

Paper birch, along with white spruce, are two species with isolated populations in the Black Hills located well south of the remainder of their species range. As such, these two species are more vulnerable to changes in climate. Even so, the Black Hills may continue to support refugia population of these species, particularly in colder, wetter locations.

Paper birch, while rare on the Forest, provides forest diversity, with some wildlife species favoring birch habitat. Like white spruce, its disjunct distribution indicates the Black Hills population represents a unique element of biodiversity which extends to its understory associates.

At-Risk Species Use of paper birch

- Tricolored bat (*Perimyotis subflavus)*
- Little brown bat *(Myotis lucifugus)*
- Groundnut (*Apios americana*)
- American milkvetch (*Astragalus americanus*)
- Mingan Moonwort (*Botrychium minganense*)
- Leathery grapefern (*Botrychium multifidum*)
- Marsh bellflower (*Campanula aparinoides*)
- Foxtail sedge (*Carex alopecoidea*)
- Slenderbeak sedge (*Carex athrostachya*)
- Southwestern showy sedge (Carex bella)
- Low northern sedge (*Carex concinna*)
- Broadleaf enchanter's nightshade (*Circaea canadensis* var. c*anadensis*)
- Limestone meadow sedge (*Carex granularis)*
- Mountain lady's slipper (*Cypripedium montanum*)
- Lung lichen (*Lobaria pulmonaria*)
- Small flowered woodrush (*Luzula parviflora*)
- Stiff clubmoss (*Lycopodium annotinum*)
- Ground cedar (*Lycopodium complanatum*)
- Nodding microseris (*Microseris nutans*)
- Five stamen miterwort (*Mitella pentandra*)
- Purple rattlesnake root (*Prenanthes racemose*)
- Drops-of-gold (*Prosartes hookeri*)
- Dark beaked moss (*Rhynchostegium serrulatum*)
- Bloodroot (*Sanguinaria canadensis*)
- Thinleaf huckleberry (*Vaccinium membranaceum*)

Risk Factors	Species Potentially Impacted
Climate change. Gradual loss of the community via replacement by other species.	All species that depend upon this habitat
Climate change induced sudden loss via catastrophic wildfire. Loss of shaded understory areas.	All plant species that depend upon this habitat
Limited potential for range expansion – can't adapt to changing climate by colonizing new areas because none of the nearby areas are or will be suitable	All species that depend upon this habitat

Risk Factors	Species Potentially Impacted
Loss of canopy cover/shaded understory	Drops-of-gold (*Prosartes hookeri*), tricolored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*) stiff clubmoss (*Lycopodium comlanatum*), ground cedar (*Lycopodium complanatum*), bloodroot (*Sanguinaria canadensis*), groundnut (*Apios americana*)

Rocky Mountain juniper (Juniperus scopulorum)

Rocky Mountain juniper is a drought-tolerant species that grows in dry climates. In the Black Hills, there are Rocky Mountain juniper woodlands and the species is found in some ponderosa pine dominated forests.

Current estimate of the extent of Rocky Mountain juniper on the Black Hills NF is 17,209 acres. This is an increase from a past estimate. In general, it is believed that reduced fire frequency, along with climate change and introduction of grazing, has led to the expansion of juniper woodlands into meadows, grasslands, and other types. However, this may be more of an issue on surrounding lands.

At-Risk Species Use of Rocky Mountain Juniper

- Some potential use by Brewer's sparrow (*Spizella breweri*) where juniper woodlands intergrade with sagebrush ecosystems.
- Pinyon jay (*Gymnorhinus cyanocephalus*)
- Ragged-leaf false goldfields (*Amauriopsis dissecta*)
- Summer milkvetch (*Astragalus hyalinus*)
- Pointed tip mariposa lily (*Calochortus apiculatus*)
- Hoary frostweed (*Crocanthemum bicknellii*)
- Nine anther prairie clover (*Dalea enneandra*)
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Buff fleabane (*Erigeron ochroleucus*)
- Pinesap (*Hypopitys monotropa*)
- Fringed myotis *(Myotis thysanodes)*
- Long-legged myotis *(Myotis volans)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
Climate change	Pinyon jay (*Gymnorhinus cyanocephalus*), fringed myotis *(Myotis thysandoes)*, long-legged myotis *(Myotis volans),* long-eared myotis *(Myotis evotis)*
Fire, exacerbated by even age stand structure	All dependent species
Grazing	Pointed tip mariposa lily (*Calochortus apiculatus*)

Limber pine (Pinus flexilis)

Limber pine occurs in isolated areas scattered over a small geographic area of about two square miles in the Black Elk Wilderness of the Black Hills National Forest and adjacent Custer State Park (Blodgett 2020). Recently many of these pines were killed by mountain pine beetle (MPB; *Dendroctonus ponderosae*) and white pine blister rust (WPBR; *Cronartium ribicola*). White pine blister rust is an exotic, invasive disease of 5-needle pines (Blodgett 2020, Blodgett 2019). There are 32 documented live limber pine on the Forest, most of which are seedlings or saplings. Limber pine is ranked as critically imperiled in South Dakota by NatureServe.

A variety of management activities have been done to help ensure persistence of this species on the Forest. This includes branch pruning to stop the spread of white pine blister rust, bulk seed collections, verbenone pouches for mountain pine beetle protection, individual "mother tree" seed collections and planting.

A new limber pine population was established in 2017 in the Norbeck Wildlife Preserve of the Black Hills National Forest. Two-year-old limber pine seedlings were planted in 2017, 2018 and 2021 at 7 areas in the preserve. Initial mortality was low, suggesting they had established and had passed the initial planting-shock. However, in 2022 some of the planted seedlings were killed by a wildfire. Additional planting in this area is planned for 2025. Observations of these new seedlings suggest limber pine grows better on sites with deep soil and no competition, versus harsh, rocky, thin-soil sites.

At-Risk Species Use of Limber Pine

- Buff fleabane (*Erigeron ochroleucus*)
- Limber pine; Rocky Mountain white pine (*Pinus flexilis*)

Risk Factors	Species Potentially Impacted
Mountain pine beetle	Limber pine (*Pinus flexilis*)
Blister rust	Limber Pine (*Pinus flexilis*)

Other forested ecosystems and species

Lodgepole Pine

Lodgepole pine is found primarily on the Northern Hills Ranger District in the Swede Gulch area. Harvest has taken place in these stands. Lodgepole pine is regenerating but not prolifically. The Forest Health Service Center has documented that some of the mature Lodgepole are being attacked by mountain pine beetle. Most, however, have not been infested.

Lodgepole pine is a very small component of the forest, estimated at less than 100 acres.

At-Risk Species use of Lodgepole Pine

- Mingan Moonwort (*Botrychium minganense*)
- Yellow hawkweed (*Hieracium fendleri*)

- Sierra rush (*Juncus nevadensis*)
- Lodgepole pine (*Pinus contorta*)
- Long-legged myotis *(Myotis volans)*
- Hoary bat *(Lasiurus cinereus)*
- Little brown bat *(Myotis lucifugus)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
Mountain pine beetle	Lodgepole pine (*Pinus contorta*)
Timber harvest	Lodgepole pine (*Pinus contorta*), long-legged myotis *(Myotis volans)*, hoary bat (*Lasiurus cinereus)*, little brown bat *(Myotis lucifugus*), long-eared myotis *(Myotis evotis)*
Extreme wildfire events	Lodgepole pine (*Pinus contorta*), long-legged myotis *(Myotis volans)*, hoary bat (*Lasiurus cinereus)*, little brown bat *(Myotis lucifugus*), long-eared myotis *(Myotis evotis)*

Douglas-Fir

Douglas-fir is found on Bearlodge, Northern Hills and Hell Canyon Ranger Districts. This species is not native to the Black Hills and was planted in past decades. Some of the Douglas-fir in the Sunday Gulch area on Hell Canyon Ranger District, planted in the 1930s, was recently cut in favor of aspen.

Douglas-fir is a very small component of the forest, estimated at less than 100 acres.

At-Risk Species Use of Douglas-Fir

No known at-risk species in the Black Hills are dependent upon Douglas-Fir

- Hoary bat *(Lasiurus cinereus)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
Timber harvest	Hoary bat (Lasiurus cinereus), long-eared myotis (Myotis evotis)

Non forested terrestrial ecosystems

Shrublands

The predominant upland shrublands on the forest are mountain mahogany (*Cercocarpus montanus*) shrublands, located on the western and southwestern portions of the Black Hills National Forest. A large swath of the mountain mahogany shrublands are within the Fanny/Boles Research Natural Area. They generally reflect stable moderate ecological integrity and are subject to occasional fires of low severity. They provide a unique plant community, habitat and browse forage for wildlife and protect soils and watersheds.

At-Risk Species Use of Dry Plains Shrublands

- Sleepy needlegrass (*Achnatherum robustum*)
- Summer milkvetch (*Astragalus hyalinus*)
- Two-form pussytoes (*Antennaria dimorpha*)
- Nine anther prairie clover (*Dalea enneandra*)
- Fendler's sandmat (*Euphorbia fendleri*)
- Idaho fescue (*Festuca idahoensis*)
- Downy gentian (*Gentiana puberulenta*)
- Bloodroot (*Sanguinaria canadensis*)
- Fringed myotis *(Myotis thysandoes)*
- Long-legged myotis *(Myotis volans)*
- Little brown bat *(Myotis lucifugus)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
Private land conversion	Downy gentian (*Gentiana puberulenta*), bloodroot (*Sanguinaria canadensis*)

Dry Mixed Grass Prairies

The most common dry mixed grass prairie type in the Black Hills is the Northern Great Plains Little Bluestem Prairie, dominated by little bluestem, blue and side-oats grama and often thread-leafed sedge. It occurs throughout the study area but stands at higher elevations tend to be reduced in size. The other Dry Mixed Grass Prairie type, Needle-and-Thread - Blue Grama Mixedgrass Prairie, is restricted to the lower elevations.

At-Risk Species use of Dry Mixed Grass Prairies

- Sleepy needlegrass (*Achnatherum robustum*)
- Summer milkvetch (*Astragalus hyalinus*)
- Frenchman's Bluff grapefern (*Botrychium gallicomontanum*)
- Bronze sedge (*Carex foenea*)
- Western sedge (*Carex occidentalis*)
- Nine anther prairie clover (*Dalea enneandra*)
- Fall rosette grass (*Dichanthelium wilcoxianum*)
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Nylon hedgehog cactus (*Echinocereus viridiflorus*)
- Idaho fescue (*Festuca idahoensis*)
- Slimleaf panicgrass (*Dichanthelium linearifolium*)
- Hooker's sandwort (*Eremogone hookeri* var. *pinetorum*)

- Downy gentian (*Gentiana puberulenta*)
- Sierra rush (*Juncus nevadensis*)
- Fernleaf biscuitroot (*Lomatium dissectum*)
- Virginia groundcherry (*Physalis virginiana*)
- Rough rattlesnake root (*Prenanthes aspera*)
- Bluebunch wheatgrass (*Pseudoroegneria spicata*)
- Northern selaginella (*Selaginella rupestris*)
- Prairie dropseed (*Sporobolus heterolepis*)
- Western bumblebee (*Bombus occidentalis*)
- Monarch (*Danaus plexippus*)
- Little brown bat *(Myotis lucifugus)*
- Black-footed ferret (*Mustela negripes*)(potential)

Risk Factors	Species Potentially Impacted
Invasion by non-native cool season perennial grasses	All dependent species
Private land conversion	All dependent species

Mesic Mixed grass Prairies and Mesic Tallgrass Prairies

Mesic mixed grass prairies are most extensive in the Red Valley and much of the Hogback Rim. Two associations are currently recognized for the Black Hills: Western Wheatgrass – Green Needlegrass and Western Wheatgrass - Needle-and-Thread Mixed grass Prairies. Stands can be difficult to classify due to shared dominants among both mesic and dry mixed-grass types. Species distribution often is patchy, with local dominance variable.

The mesic tallgrass prairie type occurs in the eastern Black Hills in the Hogback Rim, Red Vally and lower Minnekahata Foothills. The Northern Plains Big Bluestem Prairie type is characterized by moderately dense to dense graminoid cover dominated by big bluestem (*Andropogon gerardii*), often with little bluestem (*Schizachyrium scoparium*) and sideoats gramma (*Bouteloua curtipendula*).

At-Risk Species Use of Mesic mixed grass prairies and Mesic Tallgrass Prairies

- Frenchman's Bluff grapefern (*Botrychium gallicomontanum*)
- Bronze sedge (*Carex foenea*)
- Western sedge (*Carex occidentalis*)
- Nine anther prairie clover (*Dalea enneandra*)

- Bigelow's tansyaster (*Dieteria bigelovii*)
- Nylon hedgehog cactus (*Echinocereus viridiflorus*)
- Idaho fescue (*Festuca idahoensis*)
- Sierra rush (*Juncus nevadensis*)
- Rough rattlesnake root (*Prenanthes aspera*)
- Downy gentian (*Gentiana puberulenta*)
- Northern sanicle (*Sanicula graveloens*)
- Northern selaginella (*Selaginella rupestris*)
- Prairie dropseed (*Sporobolus heterolepis*)
- Western bumblebee (*Bombus occidentalis*)
- Monarch (*Danaus plexippus*)
- Little brown bat *(Myotis lucifugus)*
- Black-footed ferret (*Mustela negripes*)(potential)

Risk Factors	Species Potentially Impacted
Unmanaged grazing	All dependent species
Invasion by non-native cool season perennial grasses	All dependent species
Private land conversion	All dependent species

Black Hills Montane Grasslands

Black Hills Montane Grasslands are endemic to the Black Hills (i.e., this plant association does not occur anywhere else outside of the area), occurring at higher elevations on the Limestone Plateau in the western part of the uplift. A comprehensive survey of Black Hills Montane Grassland was completed in 1999, with additional surveys in 2011 and 2012. High-ranking examples were found on the southern Limestone Plateau. These highest-ranking examples exhibit the following three native species: *Sporobolus heterolepis, Achnatherum richardsonii, Danthonia intermedia* (prairie dropseed - Richardson's needlegrass - timber oatgrass).

At-Risk Species Use of Black Hills Montane Grasslands

- Frenchman's Bluff grapefern (*Botrychium gallicomontanum*)
- Bronze sedge (*Carex foenea*)
- Western sedge (*Carex occidentalis*)

- Nine anther prairie clover (*Dalea enneandra*)
- California oatgrass (*Danthonia californica*)
- Tufted hairgrass (*Deschampsia cespitosa*)
- Bigelow's tansyaster (*Dieteria bigelovii*)
- Idaho fescue (*Festuca idahoensis*)
- Slender cudweed (*Gnaphalium exilifolium*)
- Sierra rush (*Juncus nevadensis*)
- Bulbus woodland star (*Lithophragma glabrum*)
- Small-flowered woodrush (*Luzula parviflora*)
- Alpine notchleaf moss (*Paraleucobryum enerve*)
- Platte River cinquefoil (*Potentilla plattensis*)
- Bluebunch wheatgrass (*Pseudoroegneria spicata*)
- Western bumblebee (*Bombus occidentalis*)
- Monarch (*Danaus plexippus*)
- Fringed myotis *(Myotis thysandoes)*
- Long-legged myotis *(Myotis volans)*

Risk Factors	Species Potentially Impacted
Severe wildfires in adjacent areas (erosion, sedimentation, damage from firefighting activities).	All dependent plant species. Fringed myotis *(Myotis thysandoes)*, long-legged myotis (*Myotis volans)*
Dewatering of wet meadows.	Tufted hairgrass (*Deschampsia cespitosa*), alpine notchleaf moss (*Paraleucobryum enerve*), Platte River cinquefoil (*Potentilla plattensis*)
Invasive species	All dependent species
Unmanaged grazing	All dependent species

Aquatic Ecosystems

Lakes and Reservoirs

Ecological descriptions from this section was compiled from the Aquatic, Riparian and Groundwater Dependent Ecosystems (USDA Forest Service 2023e) assessment that was prepared in association with the Black Hills National Forest plan development. Information regarding species use of these ecosystems was compiled from the animal and plant species overviews (USDA Forest Service 2023a and 2023b) that were developed in support of this assessment.

There are 38 named lakes and ponds among the 808 surface waterbody features within the Black Hills NF. Virtually all of the lakes are man-made reservoirs that allow for control of the water levels and outflow. Total surface area of reservoirs within the Black Hills NF is

approximately 2,000 acres. Larger reservoirs are typically more resilient to fluctuations in temperature, dissolved oxygen, pollution inputs and sedimentation rates than smaller lakes. 47 smaller lakes and ponds in the South Dakota portion of the Black Hills NF are stocked and managed for trout.

At-Risk Species use of Lakes and Reservoirs

- Longleaf hook moss (*Drepanocladus longifolius*)
- Slender cudweed (*Gnaphalium exilifolium*)(margins)
- Broadfruit bur-reed (*Sparganium eurycarpum*)
- Sheathed pondweed (*Stuckenia vaginata*)(alkali waters less than 2m/6ft depth, with little wave action)
- Small white violet; Macloskey's Violet (*Viola macloskeyi*)(margins)
- Finescale dace (*Chrosomus neogaeus*)
- Hoary bat *(Lasiurus cinereus)*
- Little brown bat *(Myotis lucifugus)*

Risk Factors	Species Potentially Impacted
Drought, especially related to climate change	All dependent species
Invasive aquatic organisms	All dependent species
Pollution, water quality	Sheathed pondweed (*Stuckenia vaginata*)

Streams

There are nearly 3,500 miles of drainages within the plan area, with an estimated 950 miles of perennial streams within the boundaries of the Black Hills NF. All Black Hills streams eventually drain into either the Belle Fourche River in the north or the Cheyenne River in the south Sediment, bed and bank stability, and temperature are among the primary components of concern.

The diminution or complete disappearance of flow where streams cross sedimentary formations can be significant. These channel segments are recharge zones to aquifers, which can be an important ground-water sources. The diminution or disappearance of flow means that surface water yields can be significantly increased only in areas upstream from the loss zones—except in the case of floods or other high flows that exceed the intake capacities of channels.

Most streams, when at their base flow level, go completely dry downstream of where they cross the Minnelusa and Madison outcrops. Only Rapid Creek, Whitewood Creek, and Spearfish Creek consistently maintain perennial flows through the loss zone on the South Dakota portion of the Forest. Many miles of Forest streams disappear during drought cycles. Stream sections below such loss zones are often dry because the amount of loss exceeds stream inputs.

Ninety-five sub-watersheds that lie either completely or partially within the Black Hills National Forest were evaluated in 2010 using the Watershed Condition Framework (USDA Forest Service 2011). Forty-three sub-watersheds on the Black Hills National Forest were considered functioning properly in 2010, with the remaining 52 sub-watersheds classified as functioning at risk. There were no impaired function sub-watersheds identified on the Black Hills National Forest. Aquatic habitat condition and aquatic biota condition was considered good in more than half of the sub-watersheds. Riparian and wetland vegetation was rated as good condition in only four percent of the sub-watersheds. The ratings were updated on four sub-watersheds in 2015 and 2016 (the ratings on those four watersheds remained functioning at risk), but more updates are needed, as monitoring data indicate there has been an improvement in riparian vegetation conditions, but there has also been an increase in the amount of invasives on the forest.

At-Risk Species use of Streams

- American dipper (*Cinclus mexicanus*)
- Brownish sedge (C*arex burnnescens*)(margins)
- Emory's sedge (*Carex emoryi*)(margins)
- Spinulose woodfern (*Dryopteris carthusiana*)
- Dwarf scouring rush (*Equisetum scirpoides*)(margins)
- Slender cudweed (*Gnaphalium exilifolium*)(margins)
- Northern bugleweed (*Lycopus uniflorus*)(margins)
- Little fountain apple moss (*Philonotis fontana* var. *pumila*)(margins)
- Sageleaf willow (*Salix candida*)
- Greenleaf willow (*Salix lasiandra* var. *caudata*)
- Shining willow (*Salix lucida*)
- Small white violet (*Viola macloskeyi*)(margins)
- Finescale dace (*Chrosomus neogaeus*)
- American beaver (*Castor canadensis*)
- Hoary bat *(Lasiurus cinereus)*
- Long-legged myotis *(Myotis volans)*
- Little brown bat *(Myotis thysanodes)*
- Northern long-eared bat *(Myotis septentrionalis)*
- Tricolored bat *(Perimyotis subflavus)*

Risk Factors	Species Potentially Impacted
Drought, especially related to climate change	All dependent species
Invasive aquatic organisms	Moss species

Riparian/Wetland

Riparian ecosystems are those areas situated adjacent to rivers, lakes, and streams. These systems are characterized by periodic flooding that reorganizes alluvial soils and provides a seed bed for various riparian plant species. Riparian ecosystems support a variety of interactions between terrestrial and aquatic ecosystem constituents and are generally comprised of a variety of tall and low deciduous trees, shrub species and herbaceous plants.

Riparian areas on the forest vary considerably in terms of structure and diversity, ranging from sedge/grass/forb communities to shrub/deciduous/tree communities. Riparian stands often form mosaics of shrubs, trees, and open meadow. Oxbows and other wetlands support emergent wetland-obligate species.

In 1987 it was noted most riparian systems in the Black Hills have been severely degraded, with decreases in *Populus* and *Salix* cover. Marriot and Faber-Langendoen (2000) stated *with the heavy human use riparian systems in the Black Hills are subjected to few riparian areas remain that are relatively undisturbed, with many sites subjected to complete changes is species composition as a result of human impact*. These declines are generally attributed to historic gold and hydro mining operations, historic and current water diversions, concentration of livestock and wildlife use, and invasion by exotic (invasive) plant species.

In 2005 the effects analysis conducted for the phase II forest plan amendment concluded the selected alternative contained measures to minimize direct and indirect impacts to riparian and wetland habitats; and the most recent forest plan monitoring report noted progress was being made towards achieving the riparian objectives identified.

Since the implementation of the current forest plan, site-specific allotment management planning (grazing management) has occurred and Multiple Indicator Monitoring data show improvements in plant species composition, streambank stability, greenline width and overall wetland ratings. Timber harvest and road building can also lead to changes in sediment delivery and erosion within riparian areas, but best management practices are employed to reduce that risk.

Outside of floodplains, forests of quaking aspen and birch are located where groundwater produces adequate soil moisture to support deciduous trees. Riparian hardwood species include paper birch (*Betula papyrifera*), which are associated with higher elevation mesic northern aspects. Paper birch are often found in association with quaking aspen over burn scars, which may colonize smaller stream and drainage areas. High elevation riparian areas contain willows and water birch. The general elevation threshold between 4,000 and 6,240 feet may contain mixed stands of oak, ash, box elder, elm, and hawthorn. Lower elevation riparian shrublands contain western snowberry, gooseberry, currant, and rose with silver sagebrush occurring on floodplains.

At-Risk Species Use of Riparian/Wetland areas

- Northern long-eared bat (*Myotis septentrionalis*)
- Tricolored bat (*Perimyotis subflavus)*
- American beaver (*Castor canadensis*)
- Little brown bat *(Myotis lucifugus)*

- Hoary bat *(Lasiurus cinereus)*
- Black-chinned hummingbird (*Archilochus alexandri*)
- American dipper (*Cinclus mexicanus*)
- Black-billed cuckoo (*Coccyzus erythropthalmus*)
- Ruffed grouse (*Bonasa umbellus*)
- Western bumblebee (*Bombus occidentalis*)
- Monarch butterfly (*Danaus plexippus*)
- Ute ladies'-tresses (*Spiranthes diluvualis*)
- American milkvetch (*Astragalus americanus*)
- Leathery grapefern (*Botrychium multifidum*)
- Marsh bellflower (*Campanula aparinoides*)
- Foxtail sedge (*Carex alopecoidea*)
- Slenderbeak sedge (*Carex athrostachya*)
- Southwestern showy sedge (*Carex bella*)
- Brownish sedge (*Carex brunnescens*)
- Low northern sedge (*Carex concinna*)
- greater bladder sedge (*Carex intumescens*)
- Emory's sedge (*Carex emoryi*)
- Limestone meadow sedge (*Carex granularis)*
- Greater bladder sedge (*Carex intumescens*)
- Bristly stalked sedge (*Carex leptalea*)
- broom sedge (*Carex scoparia*)
- Blunt broom sedge (*Carex tribuloides*)
- Broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*)
- California oatgrass (*Danthonia californica*)
- Schreber's dicranella moss (*Dicranella schreberiana*)
- Shortleaf dicranum moss (*Dicranum brevifolium*)
- Longleaf hook moss (*Drepanocladus longifolius*)
- Spinulose woodfern (*Dryopteris carthusiana*)
- Ovate spikerush (*Eleocharis ovata*)
- Beaked spikerush (*Eleocharis rostellata*)
- Diverse glume wildrye (*Elymus diversiglumis*)
- Dwarf scouring rush (*Equisetum scirpoides*)
- Variegated scouring rush (*Equisetum variegatum*)

- Bitter fleabane (*Erigeron acris*)
- Tall cottongrass (*Eriophorum angustifolium*)
- Showy prairie gentian (*Eustoma exaltatum* ssp. *russellianum*)
- Slender cudweed (*Gnaphalium exilifolium*)
- Inflated notchwort (*Gymnocolea inflata*)
- Sierra rush (*Juncus nevadensis*)
- Canada lettuce (*Lactuca canadensis*)
- Broad lipped twayblade (*Listera convallarioides*)
- Stiff clubmoss (*Lycopodium annotinum*)
- Ground cedar (*Lycopodium complanatum*)
- Northern bugleweed (*Lycopus uniflorus***)**
- Curled hook moss (*Palustriella falcata*)
- Pennsylvania smartweed (*Persicaria pensylvanica*)(favors disturbed wet areas)
- Five stamen miterwort (*Mitella pentandra*)
- Alpine mountain sorrel (*Oxyria digyna*)
- Marsh grass of Parnassus (*Parnassia palustris*)
- Arrowleaf sweet coltsfoot (*Petasites frigidus* var. *sagittatus*)
- Little fountain apple moss (*Philonotis fontana* var. *pumila*)
- Greater featherwort (*Plagiochila asplenioides*)
- Scentbottle (*Platanthera dilatate*)
- Platte River cinquefoil (*Potentilla plattensis*)
- Felted leafy moss (*Rhizomnium pseudopunctatum*)
- Sageleaf willow (*Salix candida*)
- Greenleaf willow (*Salix lasiandra* var. *caudata*)
- Shining willow (*Salix lucida*)
- Autumn willow (*Salix serissima*)
- Bloodroot (*Sanguinaria canadensis*)
- Nodding saxifrage (*Saxifraga cernua*)
- Alberta saxifrage (*Saxifraga occidentalis*)
- Heath Earwort (*Scapania irrigua*)
- Woolgrass (*Scirpus cyperinus*)
- Broadfruit bur-reed (*Sparganium eurycarpum*)
- Sheathed pondweed (*Stuckenia vaginata*)
- Hairy navel lichen (*Umbilicaria hirsuta*)

- Cranberry (*Vaccinium macrocarpon*)
- Small white violet (*Viola macloskeyi*)
- Selkirk's violet (*Viola selkirkii*)

Risk Factors	Species Potentially Impacted
Drought, especially related to climate change	All dependent species
Herbivory and trampling by large ungulates	All dependent plant species, American beaver (*Castor candensis*)
Permanent water impoundment	All dependent species
Invasive plants	All dependent plant species
Impacts to riparian areas from severe wildfire in surrounding areas	Black-chinned hummingbird (*Archilochus alexandri*), greater bladder sedge (*Carex intumescens*), blunt broom sedge (*Carex tribuloides*), diverseglume wildrye (*Petasites frigidus* var. *sagittatus*), little fountain apple moss (*Philonotis fontana* var. *pumila*), greenleaf willow (*Salix lasiandra* var. *caudata*), autumn willow (*Salix serissima*), tricolored bat *(Perimyotis subflavus)*, little brown bat *(Myotis lucifugus)*, hoary bat *(Lasiurus cinereus)*
Recreation	Black-chinned hummingbird (*Archilochus alexandri*), All dependent species)
Beaver activity	Northern bugleweed (*Lycopus uniflorus*)
Decline in beaver activity	American beaver (*Castor canadensis*), tricolored bat (*Perimyotis subflavus*), black-billed cuckoo (*Coccyzus erythropthalmus*), finescale dace (*Chrosomus neogaeus*), All dependent plant species)

Karst

There is an extensive network of caves beneath the Black Hills, a result of the presence of water-soluble rocks in the geologic layers below. The most well-known caves of the Black Hills are Jewel and Wind Caves They are the third and sixth longest known caves in the world. While these two features are not managed by the Forest Service, impacts on them are considered during planning because of the underground linkages between karst resources under the Forest Service's purview and the National Park Service management of Jewel and Wind Caves.

Karst ecosystems are delicate and finite. It is assumed that the formation of new caves has substantially slowed in the recent age and protection of caves like Jewel and Wind Cave is essential to their longevity. Threats related to karst ecosystems include groundwater contamination.

At-Risk Species Use of Cave and Karst Areas

- Northern long-eared bat (*Myotis septentrionalis*)
- Long-legged myotis *(Myotis volans)*

- Little brown bat *(Myotis lucifugus)*
- Tricolored bat *(Perimyotis subflavus)*
- Fringed myotis *(Myotis thysanodes)*
- Townsend's big-eared bat *(Corynorhinus townsendii)*
- Long-eared myotis *(Myotis evotis)*

Risk Factors	Species Potentially Impacted
White-nose syndrome	Northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), long-legged myotis (*Myotis volans)*, fringed myotis *(Myotis thysanodes*), Townsend's big-eared bat *(Corynorhinus townsendii),* long-eared myotis *(Myotis evotis)*
Recreational use	Northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), long-legged myotis (*Myotis volans)*, fringed myotis *(Myotis thysanodes*), Townsend's big-eared bat *(Corynorhinus townsendii),* long-eared myotis *(Myotis evotis)*

Aquifers

The major bedrock aquifers beneath the Black Hills are the Deadwood, Madison, Minnelusa, Minnekahta, and Inyan Kara aquifers. Aquifers primarily receive recharge from infiltration of precipitation, and the Madison and Minnelusa aquifers also receive substantial recharge from streamflow losses. A Precambrian aquifer is also present at the deepest layers of geologic formation. Major aquifers are associated with the Limestone Plateau and outcrops along the Hogback encircling the Black Hills region; and that the Precambrian aquifers are associated with the granite and metamorphic central core of the Black Hills.

A study of groundwater flow, quality, and mixing in relation to Wind Cave National Park was conducted during 2007–2010. The study indicated that there were no contaminant concerns derived from sampled springs, sinks, or cave drips for the constituents analyzed (arsenic, nitrate plus nitrite, trace metals, tritium, and chlorofluorocarbons). Higher arsenic levels found in springs are likely the result of natural conditions from existing shale layers.

Lowering of the water table is a concern, as availability of groundwater is dependent on being able to reach it with wells. Aquifer observation wells in South Dakota show that water levels have fluctuated during the period of record (previous 30-50 years), but that the average water table elevation has not substantially changed in the aquifers monitored, and in many cases, was higher in 2020 than in previous years. The USGS also maintains a system of groundwater monitoring wells that may be referenced in further detail (USDA Forest Service 2023e).

Risk Factors	Species Potentially Impacted
Long term drought, especially related to climate change	Species dependent upon groundwater fed ecosystems

Phreatophytic Ecosystems

Phreatophytic ecosystems are unique due to the type of vegetation species they support and they include riparian as well as other phreatophytic ecosystems in the Forest. Phreatophytic

vegetation is always dependent on ground water and is therefore well correlated with the distribution of groundwater. The root systems of phreatophyte species are capable of penetrating to depths ranging from just over one foot to more than one hundred feet below the surface.

At-Risk Species Use of Phreatophytic Ecosystems

- Leathery grapefern (*Botrychium multifidum*)
- longleaf hook moss (*Drepanocladus longifolius*)

Risk Factors	Species Potentially Impacted
Long-term drought, especially related to climate	Leathery grapefern (*Botrychium multifidum*), longleaf hook moss (*Drepanocladus longifolius*)

Discharge Ecosystems

Discharge ecosystems occur where groundwater emerges or reaches the upper twelve inches of the ground surface. These include springs, wetlands, lakes, streams, and some riparian habitats where ground water is closer to the surface. Consequently, there is no clear division with the riparian systems described above.

Hydrological changes are the primary influence on plant communities in this group. They typically support vegetation with low to dense cover dominated by sedges, with cattails and bulrush more prevalent in larger and deeper open water areas such as ponds and lakes. Wet meadows and prairies are comparatively drier, particularly in late summer. Depressional wetlands are found in the low parts of floodplains where water collects. These sites may also occur with strongly saline soils and halophytic plant species. Floodplain forests may have an open to closed canopy dominated by deciduous trees and various willow species (*Salix* spp.) in the lower and midstory vegetation strata.

At-Risk Species Use of Discharge Ecosystems

- Southern maidenhair fern (*Adiantum capillus-veneris*)
- Alpine bistort (*Bistorta vivipara*)
- Low northern sedge (*Carex concinna*)(seeps)
- Limestone meadow sedge (*Carex granularis*)

Risk Factors	Species Potentially Impacted
Invasive Plants	All dependent plants
Herbivory and trampling by large ungulates	All dependent plants
Recreation	All dependent plants
Water diversion	All SCC that are dependent upon this ecosystem

Springs

Thousands of springs are present in the Black Hills NF. Hundreds of these springs are artesian, or free-flowing, and originate from confined aquifers around the periphery of the Black Hills, which are the formative springs for flowing surface water features. Collectively, these springs are a large source of groundwater discharge, contributing to the flow of streams, creation of wetlands, and volume of lakes in the region.

Artesian springs generally emerge from or near outcrop areas of the Spearfish Formation, which is a low permeability hydrogeologic unit. This formation has a high shale content, is interspersed with flowing groundwater in fractures, and has numerous cavities created by dissolved gypsum. Artesian springs in the southern Black Hills may flow upward through breccia pipes that allow groundwater from deep bedrock aquifers to emerge from overlying formations. Springs can be differentiated from waters originating in aquifers via temperature and hydrochemical conditions.

Warm, or geothermal, springs are a unique feature of the plan area. Warm springs have been recognized as a unique biological feature, since these habitats support several rare plant species found only in South Dakota.

- Low northern sedge (*Carex concinna*)
- Southern maidenhair fern (*Adiantum capillus-veneris*)
- Beaked spikerush (*Eleocharis rostellata*)
- Stream orchid (*Epipactis gigantea*)
- Broad lipped twayblade (*Listera convallarioides*)
- Northern long-eared bat *(Myotis septentrionalis)*
- Little brown bat *(Myotis lucifugus)*
- Tricolored bat *(Perimyotis subflavus)*
- Long-legged myotis *(Myotis volans)*
- Fringed myotis *(Myotis thysanodes)*
- Long-eared myotis *(Myotis evotis)*
- Townsend's big-eared bat *(Corynorhinus townsendii)*

Risk Factors	Species Potentially Impacted
Impacts for high intensity wildfire in adjacent areas	Stream orchid (*Epipactis gigantea*), southern maidenhair fern (*Adiantum capillus-veneris*), beaked spikerush (*Elocharis rostellata*)
Recreational impacts from use of hot/warm springs	All SCC that are dependent upon this ecosystem
Climate change	All dependent species
Reduction of water	All dependent species

Peatlands/Fens

Peatlands which include the subtypes features of fens and bogs, occur where minerotrophic groundwater emerges at the surface, such as at the lower slopes of a hill or cliff or in floodplains, and are characterized by saturated soil conditions due to an elevated water table and the accumulation of organic material. There are over 2,400 known peatlands on the Black Hills NF. Two notable examples include the McIntosh Fen and a small area on Middle Boxelder Creek.

At-Risk Species Use of Peatlands/Fens

- Ute ladies'-tresses (*Spiranthes dilivualis*)
- Alpine bistort (*Bistorta vivipara*)
- Leathery grapefern (*Botrychium multifidum*)
- Brownish sedge (*Carex brunnescens*)
- Silvery sedge (*Carex canescens*)
- Emory's sedge (*Carex emoryi*)
- Limestone meadow sedge (*Carex granularis)*
- Greater bladder sedge (*Carex intumescens*)
- Bristly stalked sedge (*Carex leptalea*)
- Broom sedge (*Carex scoparia*)
- Sheathed sedge (*Carex vaginata*)
- Dicranella moss (*Dicranella cerviculata*)
- Schreber's dicranella moss (*Dicranella schreberiana*)
- Variegated scouring rush (*Equisetum variegatum*)
- Tall cottongrass (*Eriophorum angustifolium*)
- Showy prairie gentian (*Eustoma exaltatum* ssp. *russellianum*)
- Inflated notchwort (*Gymnocolea inflata*)
- Hypnum moss (*Hypnum pratense*)
- Stiff clubmoss (*Lycopodium annotinum*)
- Northern bugleweed (*Lycopus uniflorus***)**
- Alpine notchleaf moss (*Paraleucobryum enerve*)
- Marsh grass of Parnassus (*Parnassia palustris*)
- Arrowleaf sweet coltsfoot; (*Petasites frigidus* var. *sagittatus*)
- Jensen's polytrichum moss (*Polytrichum jensenii*)
- Platte River cinquefoil (*Potentilla plattensis*)
- Felted leafy moss (*Rhizomnium pseudopunctatum*)
- Ontario rhodobryum moss (*Rhodobryum ontariense*)
- Sageleaf willow (*Salix candida*)

- Shining willow (*Salix lucida*)
- Autumn willow (*Salix serissima*)
- Heath Earwort (*Scapania irrigua*)
- Woolgrass (*Scirpus cyperinus*)
- Sphagnum; narrowleaf peatmoss (*Sphagnum angustifolium*)
- Sphagnum; Northern peatmoss (*Sphagnum capillifolium*)
- Sphagnum; Flat-top bogmoss; Flat-topped sphagnum moss (*Sphagnum fallax*)
- Sphagnum; Brownpeatmoss (*Sphagnum fuscum*)
- Cranberry (*Vaccinium macrocarpon*)
- Warnstorfia moss (*Warnstorfia pseudostraminea*)(acidic conditions)

Risk Factors	Species Potentially Impacted
Moisture balance due to climate change	All peatland/fen dependent species
Moisture balance due to human-caused water diversion, drainage or excessive groundwater withdrawal	All peatland/fen dependent species
Herbivore and trampling by large ungulates	All peatland/fen dependent plant species
Extreme wildfires (especially when accompanied by drought/lower water tables)	All peatland/fen dependent plant species

Ecological or Habitat features not addressed in Ecological Types

This section includes ecological conditions in the plan area necessary to meet the requirements for each at-risk species that were ***not*** addressed by the assessments of key ecosystem characteristics. This meets the requirements for part 4 of the 2012 Planning Rule Section 12.55. These conditions are described in greater detail below. The given species' need for these characteristics was compiled from the species overviews (USDA Forest Service 2023a and 2023b)

Large prairie dog colonies

Associated At-Risk species: black-footed ferret (*Mustela negripes*)

Black-footed ferrets require a rich supply of prey animals to meet their metabolic requirements and they prey almost exclusively on prairie dogs. This can deplete the population of smaller colonies. In areas where Black-footed ferrets are present, lethal control of prairie dog colonies or disease epidemics can reduce colony populations to levels below that necessary to support the ferrets.

Access to flowering species, especially herbaceous dicots

Associated At-Risk species: monarch butterfly (*Danaes plexipus)*, black-chinned hummingbird (*Archilochus alexandri*), Western bumblebee (*Bombus occidentalis*).

Nectar-feeding animals require access to flowering plants. Such flowering plants can be at risk from range management practices that favor grass/monocot species. Vegetative succession leading to more closed canopies with sparse understory or carpets of conifer needles that act as an allelopathic barrier to presence of herbaceous species can also lead to reduction in such flowering species and the pollinators that depend upon them. Competition from introduced honeybees reduces availability of nectar for native pollinators.

Snags for cavity roosting/nesting

Associated At-Risk species: northern Goshawk (*Accipiter gentalis*), American kestrel (*Falco sparverius*), black-backed woodpecker (*Picoides arcticus*), American three-toed woodpecker (*Picoides dorsalis*), black-billed cuckoo (*Coccyzus erythropthalmus*), Northern long-eared bat (*Myotis septentrionalis*), tricolored bat *(Perimyotis subflavus)*, American marten (*Martes americana*), long-eared myotis *(Myotis evotis),* long-legged myotis *(Myotis volans),* little brown bat *(Myotis lucifugus),* fringed myotis *(Myotis thysanodes)*

Snags used by cavity nesting bird species need to be large enough for the diameter of the tree well above ground level to be wide enough to contain a nest-sized cavity without toppling the portion of the tree above the cavity.

The cavities themselves are usually initially created by woodpecker species and often later reused by other species who may enlarge the cavity if necessary. Cavity-suitable aspen trees can be most critical because aspen stands tend to be rich in bark and cambium tunneling insects that are favored by woodpeckers. These stands with large aspen trees can then host a sort of source population of woodpeckers that forage in surrounding forests and create more cavities.

Snags of all sizes and heights are important roosting substrates for bat day roosts. Snags may serve as maternity roost for the above listed species. Some bats use snag cavities created by woodpeckers or roost in exfoliating bark found in the snags.

Risks to this habitat feature relate to removal of snags and of older larger trees that might be destined to become snags.

Sagebrush habitat

Associated At-risk species: Brewer's sparrow (*Spizella breweri*), bluebunch wheatgrass *(*Pseudoroegneria spicata)

There is very little sagebrush habitat on the Black Hills NF, this habitat type can be damaged or eliminated by fire, conifer encroachment, chaining or other practices that maintain the habitat with more grass and herbaceous vegetation and less woody vegetation.

Prey Balance

Associated At-Risk species: American kestrel (*Falco spaverius*), black-footed ferret (*Mustela negripes*), northern long-eared bat (*Myotis septentrionalis)*.

Predator species require prey. Rodent species are common prey animals for many species, insects are prey for many bird species and most bat species. Prey balance can be impacted by activities that reduce such prey species such as application of insecticide or lethal control of rodent populations.

Old roadbeds

Associated At-Risk species:

Some plant species prefer more open habitats such as road beds that are no longer in use but which have not regrown back into trees. Threats to such roads could include reactivation of the roads or illegal use of closed roads.

Calcerous/limestone soils

- Associated At-Risk species: bright green spleenwort (*Asplenium trichomanes-ramosum*), low northern sedge (*Carex concinna*), bristly stalked sedge (*Carex leptalea*), sheathed sedge (*Carex vaginata*), beaked spikerush (*Eleocharis rostellata*), buff fleabane (*Erigeron ochroleucus*), downy gentian (*Gentiana puberulenta*), hypnum moss (Hypnum pratense), curled hook moss (*Palustriella falcata*), Great Plains bladderpod (*Physaria arenosa* ssp. *argillosa*), felted leafy moss (*Rhizomnium pseudopunctatum*), sageleaf willow (*Salix candida*), three nerve goldenrod (*Solidago velutina*)

Many plant species are edaphically adapted to grow in soil types that might be less suitable or even toxic to other species. Such plants may be a competitive disadvantage in more typical "good" soil types.

Threats to this habitat are activities that disturb these soil types. Grading, covering, or compacting can damage the plants using the soil type, and this can include projects that only damage relatively small areas.

Granite outcrops in Spruce Forests

Associated At-Risk Species: Leedy's roseroot (*Rhodiola integrifolia* ssp. *leedyi*) (seeps in granite cliffs), slenderbeak sedge (*Carex athrostachya*), southwestern showy sedge (*Carex bella*), inflated notchwort (*Gymnocolea inflata*), alpine mountain sorrel (*Oxyria digyna*), three nerve goldenrod (*Solidago velutina*), Selkirk's violet (*Viola selkirkii*)

Risk to this habitat type can include recreation use such as camping near such outcrops or rock climbing, especially if climbers "clean" routes by removing plant species sprouting from cracks and crevices.

Talus slopes in spruce or mixed conifer ecosystems

Associated At-Risk species: western oakfern (Gymnocarpium *dryopteris*), thinleaf huckleberry (*Vaccinium membranaceum*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), and Townsend's big-eared bat (*Corynorhinus townsendii*).

Risks for bats in this habitat include disturbance from recreation or drilling activities.

Risk Factors not associated with specific habitat types or conditions:

The following risk factors are not limited to any particular habitat type or they impact the dominant species in the habitat, such that the risk factor is to the habitat itself. The given species' need for these characteristics was compiled from the species overviews (USDA Forest Service 2023a and 2023b)

Disease- White-pine blister rust

Species impacted: limber pine (*Pinus flexilis*).

White-pine blister rust (*Cronartium ribicola*) can be very damaging to limber pine and ecosystems dominated by limber pine, with smaller trees most severely impacted. *Ribes* species act as an intermediate host for the pathogen.

Insect: Mountain pine beetle

Species impacted: limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*).

Mountain pine beetle (*Dendroctonus ponderosae*) epidemics can be very damaging to pine-dominated forests, causing mortality as high as 95%. As the number of dead trees in the forest increases, the forest because increasingly fire prone, with greater potential for extreme fire behavior leading to stand replacement fires or fires that leave the soils damaged enough to result in post-fire vegetation communities that are markedly different from pre fire conditions.

Forests can and often do tolerate low levels of pine beetle infestation, killing small numbers of trees. When this happens many trees can be infected by small numbers of beetles, these trees typically survive. In addition, a few trees will be substantially infected and will die, but without leading to a widespread dieoff over a large area. In those situation the beetle larvae can be a valuable food source for woodpecker species. It is unclear what prompts a low density beetle infestation to morph into a widespread infestation with resultant mass die-off.

Risk factors impacting black-footed ferret (Mustela negripes)

At-Risk Species impacted: black-footed ferret

Black-footed ferrets are not vulnerable to Sylvatic plague (*Yersinia pestis*), however, their prey, black-tailed prairie dogs (*Cynomys ludovicianus*) are vulnerable to plague. The prairie dogs are known to experience large die-offs (up to 100% mortality) when exposed to flea bites that carry the bacteria. Plague can be managed by dusting prairie dog burrows with flea powder which eliminates the fleas that transmit the pathogen.

Other disease threats to black-footed ferrets include canine distemper (*paramyxovirus*), which may pass from domestic dogs and other canine predators to the ferrets. Distemper caused significant mortality among the first generation of captive bred black-footed ferrets released into the wild. The pathogen has since been recognized as a significant complicating matter in re-establishing a self-sustaining wild population. Management activities that help protect ferrets includes the immunization of feral and domestic dogs that spread distemper, as well as vaccinating the ferrets themselves.

Domestic dogs and wild canids can be a threat to black-footed ferrets and other wildlife species. Fencing and leash laws are effective tools to minimize this issue, along with predator

control for wild canids. Wildlife managers that incorporate predator and pest control strategies should exercise caution when using rodenticides. Rodenticides that are used to reduce prairie dog populations can harm or kills ferrets and wild canids when a poisoned prairie dogis consumed.

Disease- Bighorn sheep pneumonia

At-Risk species impacted: bighorn sheep (*Ovis canadensis*)

A variety of pathogens have been identified in the pneumonia complex. Disease mortality estimates of 85% of individuals have been reported in affected herds. Up to 100% lamb mortality may be expected following an outbreak.

Pathogens can be endemic to bighorn herds but can also be passed to Bighorn via contact with domestic sheep or goats.

Collection

At-Risk species potentially impacted: bright green spleenwort (Asplenium trichomanes-ramosum), fairy slipper (*Calypso bulbosa*), mountain lady's slipper (*Cypripedium montanum)*, dicranella moss (*Dicranella cerviculata*), stream orchid (*Epipactis gigantea*), showy prairie gentian (*Eustoma exaltatum* ssp. *russellianum*), broad lipped twayblade (*Listera convallarioides*), fernleaf biscuitroot (*Lomatium dissectum*), scentbottle (*Platanthera 65olans65e)*, Leedy's roseroot (*Rhodiola integrifolia* ssp. *leedyi)*, sphagnum; northern peatmoss (*Sphagnum capillifolium*), sphagnum; flat-top bogmoss (*Sphagnum fallax*), sphagnum; brown peatmoss (*Sphagnum fuscum*).

This issue can be driven by social factors with potential to impact other species. Collection may be for scientific reasons such as documenting species presence by adding to herbarium/museum collections or collecting for genetic analysis. This can include professional scientists but there are also many dedicated amateur biologists who also collect plant species.

Some collectors collect plants and fungi for medicinal, cultural or religious purposes, or for decoration. Commercial seed collectors gather seeds for use in restoration and reseeding efforts.

Disease – white-nose syndrome

At-Risk species impacted: northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes)*, long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis 65olans*)

White-nose syndrome (WNS) is caused by a fungal pathogen (*Pseudogymnoascus destructans*) establishes in areas where bats over winter, particularly caves and mines. The presence of this disease can destroy entire bat populations. Beginning around 2006, the pathogen became widespread in the eastern U.S., leading to the death of millions of bats, and has since spread across the Midwest and Great Plains. In 2018, WNS was confirmed in the Black Hills. 2022 surveys indicate dramatic declines in multiple bat species in the southern Black Hills, presumably due to WNS. Three of the above species, the northern long-eared bat, tricolored bat, and little brown bat have experience declines over 90% range-wide.

Energy development – Wind energy

At-Risk species impacted: hoary bat *(Lasiurus cinereus),* tricolored bat *(Perimyotis subflavus),* little brown bat *(Myotis lucifugus),* northern long-eared bat *(Myotis lucifugus)*

Hoary bats are the most commonly killed bat species at wind turbines. Approximately 128,000 individuals are killed each year at wind turbines in the US and Canada alone. Although there is no wind energy within the Black Hills National Forest, the species relies on the habitat within the forest during the summer. According to the USFWS, tricolored bats, little brown bats, and northern long-eared bats are negatively impacted by wind-energy, although white-nose syndrome is the primary driver of the species decline.

Stochastic extirpation

At-Risk species potentially impacted: groundnut (*Apios americana*), sheathed sedge (*Carex vaginata*), broadleaf enchanter's nightshade (*Circaea canadensis* var. *canadensis*), shortleaf dicranum moss (*Dicranum brevifolium*), beaked spikerush (*Eleocharis rostellata*), dwarf scouring rush (*Equisetum scirpoides*), limber pine (*Pinus flexilis)*, alpine notchleaf moss (*Paraleucobryum enerve*), marsh grass of Parnassus (*Parnassia palustris*), Leedy's roseroot (*Rhodiola integrifolia* ssp. *leedyi*), five stamen miterwort *(Mitella pentandra*), sageleaf willow (*Salix candida*), shining willow (*Salix lucida*), cranberry (*Vaccinium macrocarpon*), finescale dace (*Chrosomus neogaeus*)

Stochastic extirpation refers to the risk that some species face due to having very low population numbers or very small habitats or ranges. The risk is that relatively small actions could result in the loss of such a species within the plan area. For example, if a species has a habitat consisting of one small wetland and that wetland is drained. Or if a small section of stream becomes polluted and that section is the only place a given species of fish still survives on the plan area.

These sorts of impacts can be unpredictable and rare. They are generally avoided through proper application of project-level planning processes, but the risk remains.

Non-native Invasive Plants: Direct threat or risk from management of invasive plants

At-Risk species potentially impacted: two-form pussytoes (*Antennaria dimorpha*)*,* groundnut (*Apios americana*), summer milkvetch (*Astragalus hyalinus*), Emory's sedge (*Carex emoryi*), bronze sedge (*Carex foenea*), hoary frostweed (*Crocanthemum bicknellii*), mountain cryptantha **(***Cryptantha cana*), nine anther prairie clover (*Dalea enneandra*), California oatgrass (*Danthonia californica*), slimleaf panicgrass (*Dichanthelium linearifolium*), Bigelow's tansyaster (*Dieteria bigelovii*), nylon hedgehog cactus (*Echinocereus viridiflorus*), stream orchid (*Epipactis gigantea*), bitter fleabane (*Erigeron acris*), buff fleabane (*Erigeron ochroleucus*), fendler's sandmat (*Euphoriba fendleri*), Idaho fescue (*Festuca idahoensis*), downy gentian (*Gentiana puberulenta*), Sierra rush (*Juncus nevadensis*), bulbus woodland star (*Lithophragma glabrum*), fernleaf biscuitroot (*Lomatium dissectum*), stiff clubmoss (*Lycopodium annotinum*), onion grass (*Melica bulbosa*), nodding microseris (*Microseris nutans*), wax leaf penstemon (*Penstemon nitidus*), Great Plains bladderpod (*Physaria arenosa* ssp. *argillosa*), rough rattlesnake root (*Prenanthes aspera*), dark beaked moss (*Rhynchostegium serrulatum*), autumn willow (*Salix serissima*), bloodroot (*Sanguinaria canadensis*), northern selaginella (*Selaginella rupestris*), three nerve goldenrod (*Solidago*

velutina), prairie dropseed (*Sporobolus heterolepis*), sheathed pondweed (*Stuckenia vaginata*), western bumblebee (*Bombus occidentalis).*

Invasive plants have been recognized as second only to land development in causing loss of biodiversity. They impact native plant communities and biodiversity in several ways, including changes in plant community structure that result in changes in native species richness and abundance. Mechanisms for changes in plant communities due to invasives species include changes in soil chemistry; changes in nitrogen cycling, or allelopathy; changes in soil biota and soil moisture; changes in habitat and nutrition quality and quantity for producers (green plants) and consumers (wildlife, livestock); changes in competition patterns for resources such as light and nutrients; and changes in ecosystem processes, such as hydrologic regimes, decomposition rates, and natural fire frequencies. Non-native invasive plants can be toxic to native wildlife or cause physical harm to them by damaging digestive systems or by penetrating eyes or sinuses with burred seeds.

In counter-intuitive comparison, invasive plant *control* can also be harmful to native species via inappropriately planned herbicide applications, physical control, or use of livestock for control. All such methods can be viable when used appropriately and not inherently impactful to rare species, the risk stems instead from specifics of how the projects are planned or implemented. This is not a natural sort of risk, but still falls within the scope of this assessment because the assessment will be used to help guide development of the land management plan that will in turn be used to guide planning and implementation of these projects.

Ecological conditions in the plan area necessary to meet the requirements of for each at-risk species.

The Forest Service commissioned a species overview for every species that met the "Must Consider" or "Should" consider criteria for SCC as outlined in the Land Management Planning Handbook. The overviews were reviewed by USFS biologists who then summarized the information in spreadsheets. These spreadsheets are part of the project record and will be publicly available.

A general concept of the 2012 Planning Rule is to manage SCC and other species by ensuring that the forest plan appropriately manages the ecological conditions and features used by those species. As the Black Hills National Forest plan is revised, plan components will be crafted to best manage the conditions and features required by such species. The goal is that as projects tier off the forest plan, the projects will also protect (or fail to harm) the habitat conditions and features required by SCC so long as the project is consistent with all forest plan components.

These conditions and features from the spreadsheet are summarized below. Species associated with each one is shown in Table 3.

Freedom from physical disturbance to individuals and/or habitat

Species in this group require usually fairly specific habitat types (such as fens, or unique and rare soil types) and can survive as long as those habitat features are not heavily altered or destroyed. In theory, many species can require specific habitat types to survive, but for the

most part the species that get assigned to SCC lists under this rationale have requirements for rare habitat types.

Freedom from competition from non-native invasive plants and/or the impacts of the treatment of those invasive plants

Invasive plants can alter habitat in a great many ways. They can out-compete native plants for resources such as sun (or shade), water, and soil nutrients. They can be toxic or physically damaging to wildlife. They can be allopathic – which means that they made the soil toxic or incompatible to other plant species. Many invasive plant species establish well in recently disturbed soil, such as after construction, or flooding, or fires. Such plants can quickly dominate the environment, preventing native plants from re-establishing after the disturbance and spreading from the disturbed area into otherwise intact habitat.

Conversely, management of non-native invasive plants can also be harmful to SCC. Herbicides used to treat invasive plants can also harm native plant species. Birds and pollinators may have become dependent upon non-native species for nesting areas or nectar, such that sudden removal of the non-native invasive species can be detrimental. This does not always preclude treatment/removal of such non-native invasive species but can require careful planning in the treatment to insure continuation of habitat requirements via re-establishment of native species on an appropriate time frame, or to ensure that the herbicide program uses the most appropriate choice of herbicide and timing and methods of application to avoid harm to native species.

Maintenance of shade and/or soil moisture and/or prevention of the loss of canopy

Many rare plants, mollusks and other invertebrates require moist, shaded understories. Removal of tree canopy cover can open these areas up to direct sunlight, warming and drying out the soils and leaf litter, which can harm these species. In addition some predator species are adapted hunting in such environments, using the low light or dense vegetation to hide their movements.

Intact cliff and/or seep habitat

Cliffs (especially cracks in cliffs) and seeps emanating from cliffs are often home to unique species. The cliff habitat is separated enough and different enough from the surrounding environment to be reproductively isolated. Changes in the environment can threaten this environment by increasing temperatures or by changing the moisture balance.

Very hot wildfires can change cliff habitat via spalling, when the front surface of the rock face flakes off due to uneven heating. Drought can reduce moisture content of seeps. Loss of pollinators can impact flowering plants that are adapted to grow in such unique environments. Cliff-growing plant species may be adapted to grow on specific rock types such as granite or limestone.

Recreation can also impact such environments as rock climbers establish new routes or “clean” routes to ensure good handholds and safe anchor placement. Recreational activity may also harass cliff-nesting wildlife species.

Intact wetland or riparian habitat

Many rare and at-risk species use wetland habitat. This can be wet or partially flooded areas next to lakes and streams as well as fens and other wetlands not associated with larger bodies or water. Wetlands are usually associated with hydric soils Some wetlands (fens in particular) tend to develop unique chemistry, often being acidic and containing high iron content.

Intact dry rocky habitat

Several proposed SCC on the Black Hills National Forest occur primarily in areas of bare rocky terrain, including openings in mixed conifer forests and ponderosa pine.

Specific habitat or host species

Many rare and at-risk species (both plants and animals) are dependent upon an associated species. Examples would be pollinators that are adapted to only be able to obtain pollen from one species of flower, or which require a different species upon which to lay eggs and feed caterpillars. Conversely, some flowering plant species can only be pollinated by just a few insect species. Some plants and fungus are saprophytic parasites than can only survive by deriving shelter and nutrition from a single host plant species.

Impacted by a departure from natural disturbance, needs disturbance restored.

Natural disturbance can take many forms. Some plant species do best in soils which have recently been disturbed. This is true to many invasive species but can also be true to some native species as well. Examples of natural soil disturbance can be animal digging such as ground squirrels and prairie dogs, or the rootwads of fallen trees, or flooding. Plants adapted to such recent soil disturbance are termed “ruderal”. Sand dunes are another example, maintained by wind and dry conditions.

Other species survive in the short-lived condition following severe forest events such and large scale windthrow or intense wildfires.

Human activities can mimic or disrupt such natural events such that they may favor or hurt adapted species.

Intact open habitat

Many species require open habitat such as open meadows or prairie. Such species are often shade intolerant, requiring full sunlight to grow well, or are adapted to poor soils and short growing seasons. Some wildlife species also prefer open habitat. Some raptors hunt well where there is little cover for wildlife species. In contrast, some prey species prefer open habitat as it makes it difficult for predators to get close without detection.

Such open habitat may be maintained due to climate factors that make it difficult for trees to grow well, such as the dry conditions present in short grass prairie . Other open habitat may stay in that configuration due to wildfire or other naturally reoccurring natural disturbances.

Large trees

Some species need large trees to survive. This can include species that use such trees as nesting platforms, cavity nesters, and/or foraging. In the case of cavity nesting species, the trees must be wide enough to accommodate such cavities without causing too much

structural damage to the trees. Large trees become large snags which are particularly valuable to many species. The structural conditions associated with mature forest and old growth, such as elevated basal canopy height, are needed for foraging by some species.

Table 3: Ecological conditions in the plan area necessary to meet the requirements of for each at-risk species.

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
TEPC Species											
Black footed ferrets	*Mustela nigripes*	X						X			
Northern long-eared bat	*Myotis septentrionalis*	X		X	X	X		X			X
Tricolored bat	*Perimyotic subflavus*	X		X		X		X			X
Red knot	*Calidris canatus rufa*					X					
Monarch butterfly	*Danaus plexippus*		X			X				X	
Leedy's Roseroot	*Rhodiola integrifolia* ssp. *leedyi*	X	X		X						
Ute ladies'-tresses	*Spiranthes diluvualis*		X	X		X			X		
SCC Animals											
Northern goshawk	*Accipiter gentilis*	X		X				X			X
Black-chinned hummingbird	*Archilochus alexandri*	X									
Ruffed grouse	*Bonasa umbellus*			X				X (aspen and mixed-pine hardwood stands)	X (Fire)		
American dipper	*Cinclus mexicanus*	X						X			
Black-billed cuckoo	*Coccyzus erythropthalmus*										X
American Kestrel	*Falco sparverius*										X

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
Black-backed Woodpecker	*Picoides arcticus*			X				X	X		X
American three-toed woodpecker	*Picoides dorsalis*										X
Brewer's sparrow	*Spizella breweri*	X						X			
Pinyon jay	*Gymnorhinus cyanocephalus*							X			
Pacific marten	*Martes caurina*			X				X			X
Bighorn sheep	*Ovis canadensis*						X		X		
American beaver	*Castor canadensis*	X						X	X		
Finescale dace	*Chrosomus neogaeus*							X			
Hoary Bat	*Lasiurus cinereus*			X		X				X	X
Little brown bat	*Myotis lucifugus*	X		X	X	X					X
Fringed myotis	*Myotis thysanodes*	X			X		X				X
Long-eared myotis	*Myotis evotis*	X			X		X				X
Long-legged myotis	*Myotis volans*	X			X		X				X
Western bumblebee	*Bombus occidentalis*		X								
Cooper's mountainsnail	*Oreohelix cooperi*			X				X			
Callused vertigo snail	*Vertigo arthuri*			X				X			

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
SCC Plants											
Sleepy needlegrass	*Achnatherum robustum*		X							X	
Southern Maidenhair Fern	*Adiantum capillus-veneris*	X	X			X		X Warm springs			
Ragged-leaf False Goldfields	*Amauriopsis dissecta*		X					Open conifer forests			
Two-form Pussytoes	*Antennaria dimorpha*		X								
Groundnut	*Apios americana*		X	X							
Bright green spleenwort	*Asplenium trichomanes-ramosum*	X			X						
American milkvetch	*Astragalus americanus*		X	X		X					
Summer milkvetch	*Astragalus hyalinus*		X							X	
Bartramia moss	*Bartramia pomiformis* var. *pomiformis*			X							
Alpine bistort	*Bistorta vivipara*	X	X	X		X		Remnant boreal forest			
Frenchman's Bluff grapefern	*Botrychium gallicomontanum*		X					X Grasslands with limestone soil	X	X	
Mingan Moonwort	*Botrychium minganense*		X						X		
Leathery grapefern	*Botrychium multifidum*		X	X Soil moisture					X		
Pointed tip mariposa lily	*Calochortus apiculatus*	X	X				X				

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
Fairy slipper	*Calypso bulbosa*	X	X	X				High elevation spruce forests			
Marsh bellflower	*Campanula aparinoides*	X	X			X		X			
Foxtail sedge	*Carex alopecoidea*		X			X					
Slenderbeak sedge	*Carex athrostachya*		X			X					
Southwestern showy sedge	*Carex bella*	X		X				X Granite outcrops in spruce forests		X	
Brownish sedge	*Carex brunnescens*		X	X		X				X	
Silvery sedge	*Carex canescens*		X	X		X					
Low northern sedge	*Carex concinna*	X	X	X	X	X		Calcareous soils			
Emory's sedge	*Carex emoryi*	X	X			X					
Bronze sedge	*Carex foenea*		X								
Limestone meadow sedge	*Carex granularis*	X		X		X					
Greater bladder sedge	*Carex intumescens*			X		X					
Bristly stalked sedge	*Carex leptalea*	X	X			X					
Western sedge	*Carex occidentalis*		X								
Broom sedge	*Carex scoparia*	X	X			X					
Blunt broom sedge	*Carex tribuloides*		X			X					
Sheathed sedge	*Carex vaginata*		X	X		X		fens, wetlands			

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
Squareleaf crestwort	*Chiloscyphus polyanthos*										
Broadleaf enchanter's nightshade	*Circaea canadensis* var. *canadensis*	X	X	X		X					
Hoary frostweed	*Crocanthemum bicknellii*		X								
Mountain cryptantha	*Cryptantha cana*		X								
Wild comfrey	*Cynoglossum virginianum* var. *boreale*										
Mountain lady's slipper	*Cypripedium montanum*	X	X	X						X	
Nine anther prairie clover	*Dalea enneandra*		X								
California oatgrass	*Danthonia californica*		X					montane meadows		X	
Tufted hairgrass	*Deschampsia cespitosa*		X			X		moist meadows		X	
Slimleaf panicgrass	*Dichanthelium linearifolium*	X	X				X			X	
Dicranella moss	*Dicranella cerviculata*			X		X				X	
Schreber's dicranella moss	*Dicranella schreberiana*				X	X					
Shortleaf dicranum moss	*Dicranum brevifolium*				X			rocks and rotted wood			
Ontario dicranum moss	*Dicranum ontariense*					X		humus and rotting wood			
Fall rosette grass	*Dichanthelium wilcoxianum*										

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Bigelow's tansyaster	*Dieteria bigelovii*		X								
Longleaf hook moss	*Drepanocladus longifolius*					X		submerged			
Spinulose woodfern	*Dryopteris carthusiana*	X	X	X		X					
Nylon hedgehog cactus	*Echinocereus viridiflorus*		X								
Ovate spikerush	*Eleocharis ovata*		X			X					
Beaked spikerush	*Eleocharis rostellata*		X			X		X			
Diverseglume wildrye	*Elymus diversiglumis*		X	X		X					
Stream orchid	*Epipactis gigantea*	X	X		X	X		X			
Dwarf scouring rush	*Equisetum scirpoides*	X	X	X		X					
Variegated scouring rush	*Equisetum variegatum*		X			X					
Hooker's sandwort	*Eremogone hookeri* var. *pinetorum*		X					open pine and spruce woodland			
Bitter fleabane	*Erigeron acris*		X								
Buff fleabane	*Erigeron ochroleucus*		X								
Tall cottongrass	*Eriophorum angustifolium*		X			X					
Fendler's sandmat	*Euphorbia fendleri*		X								
Showy prairie gentian	*Eustoma exaltatum* ssp. *russellianum*	X	X			X					

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
Idaho fescue	*Festuca idahoensis*		X								
Spotted fritillary	*Fritillaria atropurpurea*										
Downy Gentian	*Gentiana puberulenta*		X					savannah type communities-associated with limestone		X	
Slender cudweed	*Gnaphalium exilifolium*		X			X		Moist mountain meadow		X	
Smooth-capsuled dry rock moss	*Grimmia laevigata*										
Western oakfern	*Gymnocarpium dryopteris*			X	X						
Inflated notchwort	*Gymnocolea inflata*				X	X					
Jerusalem artichoke	*Helianthus tuberosus*								X		
Shortbristle needle and thread	*Hesperostipa curtiseta*										
Yellow hawkweed	*Hieracium fendleri*		X								
Hypnum moss	*Hypnum pratense*					X					
Pinesap	*Hypopitys monotropa*										
Sierra rush	*Juncus nevadensis*		X								
Canada lettuce	*Lactuca canadensis*					X					

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Large pod pinweed	*Lechea intermedia* var. *intermedia*	X	X				X				
Rice cutgrass	*Leersia oryzoides*										
Wolf lichen	*Letharia vulpina*							bark above snowline			
Broad lipped twayblade	*Listera convallarioides*	X	X	X	X	X		X			
Bulbus woodland star	*Lithophragma glabrum*		X								
Lung lichen	*Lobaria pulmonaria*	X									
Fernleaf biscuitroot	*Lomatium dissectum*		X								
Hairy woodrush	*Luzula acuminata* var. *acuminata*			X (needs shaded areas, but has less requirement for soil moisture.)					X grows well in shaded areas, but that can include second-growth shrubby areas.		
Small flowered woodrush	*Luzula parviflora*		X	X		X					
Stiff clubmoss	*Lycopodium annotinum*		X	X				spruce birch hazel			
Ground cedar	*Lycopodium complanatum*		X	X				boreal remnant	X		
Tree ground pine	*Lycopodium dendroideum*										
Northern bugleweed	*Lycopus uniflorus*	X	X			X					
Ostrich fern	*Matteuccia struthiopteris*										
Onion grass	*Melica bulbosa*		X								

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Nodding microseris	*Microseris nutans*		X								
Five stamen miterwort	*Mitella pentandra*	X	X	X	X	X		spruce birch/hazel			
Spring forget-me-not	*Myosotis verna*		X							X	
One flowered broomrape	*Orobanche uniflora*										
Alpine mountain sorrel	*Oxyria digyna*			X				X			
Curled hook moss	*Palustriella falcata*					X		X calcareous soils			
Alpine notchleaf moss	*Paraleucobryum enerve*				X	X					
Marsh grass of Parnassus	*Parnassia palustris*	X	X			X					
Giant lousewort	*Pedicularis procera*			X							
Wax leaf penstemon	*Penstemon nitidus*		X								
Pennsylvania smartweed	*Persicaria pensylvanica*								X		
Arrowleaf sweet coltsfoot	*Petasites frigidus* var. *sagittatus*		X	X		X					
Threadleaf phacelia	*Phacelia linearis*										
American lopseed	*Phryma leptostachya*		X	X							
Virginia groundcherry	*Physalis virginiana*		X						X (appears to be a ruderal species)		
Little fountain apple moss	*Philonotis fontana* var. *pumila*				X	X					

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Great Plains bladderpod	*Physaria arenosa* ssp. *argillosa*		X								
Lodgepole pine	*Pinus contorta*	X						mixed conifer forest with dry soils			
Limber pine	*Pinus flexilis*	X					X		X	X	
Mountain ricegrass	*Piptatherum pungens*										
Greater featherwort	*Plagiochila asplenioides*		X			X					
Scentbottle	*Platanthera dilatata*	X	X	X		X					
Whorled milkwort	*Polygala verticillata*										
Climbing false buckwheat	*Polygonum scandens*										
Jensen's polytrichum moss	*Polytrichum jensenii*					X					
Platte River cinquefoil	*Potentilla plattensis*		X			X		moist meadow			
Rough rattlesnake root	*Prenanthes racemose*		X								
Purple rattlesnake root	*Prenanthes racemosa*	X									
Drops-of-gold	*Prosartes hookeri*	X	X	X				Paper-hazel-aspen			
Bluebunch wheatgrass	*Pseudoroegneria spicata*										
Intense light and dark lichen	*Pseudevernia intensa*	X						bark of conifers			
Cartilage lichen	*Ramalina sinensis*							found on various conifer species			

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Felted leafy moss	*Rhizomnium pseudopunctatum*					X		calcareous and rich			
Ontario rhodobryum moss	*Rhodobryum ontariense*					X					
Dark beaked moss	*Rhynchostegium serrulatum*		X								
Syed's bryum moss	*Rosulabryum laevifilum*					X					
Sageleaf willow	*Salix candida*	X	X		X	X		fens/wetlands			
Greenleaf willow	*Salix lasiandra var. caudata*		X			X		X Floodplains, streambeds			
Shining willow	*Salix lucida*		X			X		X Floodplain/streambed			
Autumn willow	*Salix serissima*	X	X			X		fens/wetlands			
Bloodroot	*Sanguinaria canadensis*	X	X	X				mostly with hardwood communities			
Nodding saxifrage	*Saxifraga cernua*		X	X		X					
Alberta saxifrage	*Saxifraga occidentalis*		X			X				X	
Heath Earwort	*Scapania irrigua*					X					
Woolgrass	*Scirpus cyperinus*					X					
Northern selaginella	*Selaginella rupestris*	X						ponderosa woodlands and grasslands			
Three nerve goldenrod	*Solidago velutina*		X								

Common Name	Scientific Name	Needs freedom from physical disturbance to individuals and/or habitat	Needs freedom from competition from weeds and/or the impacts of the treatment of those weeds	Needs the maintenance of shade and/or soil moisture and/or prevention of the loss of canopy	Needs intact cliff and/or seep habitat	Needs intact wetland or riparian habitat	Needs intact dry rocky habitat	Needs a specific habitat or host species	Impacted by a departure from natural disturbance, needs disturbance restored	Needs intact open habitat	Needs large trees
Broadfruit bur-reed	*Sparganium eurycarpum*	X	X			X					
Narrowleaf peatmoss	*Sphagnum angustifolium*	X				X					
Northern Peatmoss	*Sphagnum capillifolium*	X				X		fens/wetlands			
Flat-top Bogmoss	*Sphagnum fallax*	X				X		fens/wetlands			
Brown Peatmoss	*Sphagnum fuscum*	X				X		fens/wetlands			
Prairie dropseed	*Sporobolus heterolepis*		X								
Sheathed pondweed	*Stuckenia vaginata*	X	X			X		submerged			
Hairy navel lichen	*Umbilicaria hirsuta*				X			on silicious rocks			
Cranberry	*Vaccinium macrocarpon*	X	X	X		X		fens/wetlands			
Thinleaf huckleberry	*Vaccinium membranaceum*	X	X								
Small white violet	*Viola macloskeyi*					X					
Selkirk's violet	*Viola selkirkii*	X	X	X		X		remnant boreal forest			
Warnstorfia moss	*Warnstorfia pseudostraminea*				X	X					

Chapter 4. Sustainability

Environmental Sustainability of At-Risk Species

Environmental sustainability of At-Risk species on the Black Hills National Forest is the ability of the At-Risk species to maintain or recover viable populations, as well as to function in ways that support interdependent species. This means that the At-Risk species survive, but also contribute to the survival of other species, by acting as food sources, or by manipulating their environment in ways that benefits other species (such as butterflies pollinating flowers).

At-Risk species are, almost by definition, of uncertain environmental sustainability.

Economic Sustainability of At-Risk Species

The economic value of At-Risk species has several aspects to it. The public sees value in the preservation of species perceived as rare or at-risk. This translates into support for programs aimed at protecting or recovering these species, which have economic impacts in the form of government/other employees who work with the species (both in the species' local environment, as well as off-site workers). Tourism to see these species and the environments that they depend upon also has economic impacts.

Protection of native species environments can translate into indirect economic value, such as decreased costs for cities to purify drinking water if water quality is better due to measure designed primarily to protect native fish.

There can be negative impacts as well, in the form of restrictions and regulations. Ranchers may need to spend more money on fences or move cattle more often, special use permits may be denied, and timber harvest volume can drop.

It can be possible for the economic aspects of the management of At-Risk species to be mixed. Some groups benefit and others see harm; the impacts to these groups can change or even swap as regulations increase or decrease over time due to changes in law and the policies of the government agencies that manage At-Risk species and their environments. Extractive users and tourism-related businesses often face such alternate impacts.

Overall, the economic sustainability of At-Risk species is strongly tied to the social perception of the value of these species as translated through policy, law, and consumer choice.

Social Sustainability of At-Risk Species

At-Risk species have social value. To some extent, the *social* sustainability of species can be the inverse of their perceived *environmental* sustainability. People may value species more because they are perceived as being rare or at-risk (Angulo and Courchanp, 2009). Conversely, people may see the social value of species protection drop if they perceive that the costs of protecting the species are too high (Semeniuk 2018).

This makes for a mixed analysis of the social sustainability of At-Risk species. People will support the continued protection and management of such species but may withdraw that

social support if the economic cost is perceived as being too high, or government regulation too restrictive.

Chapter 5. Potential Need for Forest Plan Changes

At-Risk Species

The Black Hills National Forest will continue to work with the public, state, and county officials to develop appropriate plan components for both threatened and endangered species, as well as species of conservation concern (SCC) throughout the plan revision process. Current plan components will be evaluated for the protection of any listed species. New plan components will likely be developed to meet the intent of the complementary ecosystem and species-specific approach to provide for the diversity of plant and animal communities and ensuring the planning area provides conditions for native species. The 2012 planning rule allows for ecosystem (coarse filter) plan components instead of components assigned for each plant or animal species of conservation concern.

References Cited

Editor's Note: Most of the information presented here is taken from other assessments associated with the Black Hills Plan Revision or from the species overviews that were commissioned to support this assessment. Those are secondary sources, developed by reviewing and analyzing the primary scientific literature. The assessment and overviews themselves cited hundreds of primary-source documents.

This document only cites the sources that were directly reviewed by the staff that wrote this document – mostly the secondary sources that compiled information from the hundreds of primary sources.

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Appendix 1. Threatened, Endangered, Proposed and Candidate species ecosystems and habitat characteristics

This section gives a brief overview of Threatened, Endangered, Proposed and Candidate (TEPC) species that will be managed in the forest plan and analyzed in the Environmental Impact Statement.

The choice of which TEPC species to analyze is not made by the Forest Service, it is made by the USFWS. It includes all TEPC species that are:

- Known to occur on the plan area.
- Potentially impacted by management of the plan area, this can include off-site impacts such as water quality impacts well downstream of the plan area.
- Species which may be present in the plan area but which have not been detected.
- Species which are known to occur near and have suitable habitat in the plan area and may recolonize the location (even if no reintroduction is planned).

As the forest plan and EIS are developed, the Forest Service will also develop a Biological Analysis (BA) of affects to these species. The BA will be the primary in-depth look at these species.

Black-footed Ferret (*Mustela negripes*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

Historical range covered much of western North America's intermountain and prairie grasslands coinciding with black-tailed, white-tailed, and Gunnison's prairie dog distributions. Current distribution consists of 16 sites in 8 states, Canada, and Mexico (USDI Fish and Wildlife Service 2010). Two of those sites are adjacent to Black Hills National Forest or nearby (Wind Cave National Park and Badlands National Park), but there are no current plans to reintroduce the species onto the forest.

The Black Hills National Forest has one historical record, on the Bearlodge Ranger District. There is currently no Black-footed ferret population in the plan area.

Ecological Requirements, Current Condition and Trends

Suitable habitat consists of grasslands and prairies containing prairie dog towns. Ferrets use existing prairie dog burrows for shelter and feed predominately on prairie dogs. One female ferret and her young need 200 prairie dogs a year to sustain them (SDSU Extension 2021).

Mating season occurs from March to April. Gestation lasts about 41 to 43 days with kits born May to June. Kits stay below ground until they are approximately 2 months old, after which the mother moves them to different burrows within the home range (USDI Fish and Wildlife Service 2010).

Home range of females occupying high-density prairie dog habitat averages approximately 148 acres, whereas males average about 321 acres. Female and male territories average 32 acres and 89 acres, respectively (USDI Fish and Wildlife Service 2013).

The following actions are identified to address threats to black-footed ferret and promote recovery of the species (USDI Fish and Wildlife Service 2013):

1. Conserve and manage a captive ferret population of sufficient size and structure to support genetic management and reintroduction efforts.
2. Identify prairie dog habitats with the highest biological potential for supporting future free-ranging populations of ferrets.
3. Establish free-ranging populations of ferrets to meet downlisting and delisting criteria.
4. Ensure sufficient habitat to support a wide distribution of ferret populations over the long-term considering social, political, and economic concerns of local residents.
5. Reduce disease-related threats in wild populations of ferrets and associated species.
6. Support partner involvement and conduct adaptive management through cooperative interchange.

Threats and Risk Factors

Black-footed ferret population declines are attributed primarily to three factors: conversion of native grassland to cropland, poisoning of prairie dogs to reduce competition with domestic livestock, and introduction of the exotic disease – sylvatic plague. Each of these factors resulted in substantial loss of prairie dogs, leading to an even greater decline in ferret populations because of the species' dependency on large expanses of habitat occupied by prairie dogs (Lockhart et al. 2006 cited in USDI Fish and Wildlife Service 2013).

Currently, the primary threat to the black-footed ferret is disease (i.e., sylvatic plague and canine distemper). Other risk factors include ongoing habitat loss due to conversion, recreational shooting, predation, poisoning of prairie dogs, and climate change (USDI Fish and Wildlife Service 2013).

Northern Long-eared bat (*Myotis septentrionalis*)

Distribution, Abundance, Demographics, and Population Trends on the Black Hills National Forest

This species has been documented widely across the Black Hills National Forest, roosting in caves and foraging throughout the area. Range wide, the population has experienced a severe decline. Preliminary research conducted in summer 2022 captured only three northern long-eared bats, out of two-hundred bat captures (Lile 2022). Population declines for this species is occurring in the Black Hills National Forest. Compared to historical capture records, the results from the 2022 research warrant concern for this species.

Ecological Requirements, Current Condition and Trends

Northern long-eared bat habitat changes throughout the year. During the active period, defined as activities related to reproduction, foraging, rearing young is defined from May 16

– September 30 in the Black Hills National Forest (USFWS 2023), The primary ecological requirement for Northern long-eared bat during this time is within the forest. In the Black Hills National Forest, the species such as Quaking Aspen *Populus tremuloides*, Burr Oak *Quercus macrocarpa*, and Ponderosa Pine *Pinus ponderosa* for day roosting (Whittle 2022, Abernathy 2015, 2016). Males and females roost separately, with the females utilizing larger diameter trees (Whittle 2022). Roost tree size varies, with the smallest sized trees used measuring three inches. Solitary males and females have been documented in the Black Hills NF to roost in rock crevices, cliffs, caves, and mines during the summer months. During spring emergence, females gather at maternity roosts to begin the pup-rearing season, which extends into August 15. After the pup rearing season, bats swarm at cave hibernacula sites where mating occurs.

The inactive period, defined at the period of time where the bat is in torpor, or semi-hibernating, occurs October 1-May 15 (USFWS 2023). The northern long-eared bat can be found overwintering in caves or abandoned mines during this period.. Such caves or mines required for hibernation rely on a set humidity, lack of airflow, and temperature (USFWS 2023). Ideally, this environment should be free of the white-nose syndrome causing pathogen.

The population decline is primarily driven by mortality caused by white-nose syndrome.

Threats and Risk Factors

Although there are many threats to the species, the predominant threat by far is white-nose syndrome. If this disease had not emerged, it is unlikely the northern long-eared bat would be experiencing such dramatic population declines. White-nose syndrome was the main reason for listing the species as threatened under the Endangered Species Act in 2015. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly throughout the species' range in the United States. Numbers of northern long-eared bats, gathered from hibernacula counts, have declined by 97 to 100% across the species’ range (USDI Fish and Wildlife Service 2023c).

Additional risk factors include mortality due to collisions with wind turbine blades, human disturbance in caves/mines, summer habitat loss, loss of access to winter hibernacula, and climate change.

Tricolored bat (*Perimyotis subflavus*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

Tricolored bat has been documented in five different abandoned mines within the plan area. At least one known cave in the Northern Hills has supported the species over the winter for multiple years, with a most recent observation in 2022. It has also been detected hunting insects above a pond.

Ecological Requirements, Current Condition and Trends

This once common species ranges across the eastern and central United States and portions of southern Canada, Mexico and Central America. During the winter, tricolored bats are found in caves and mines, although in the southern United States, where caves are sparse,

tricolored bats are often found roosting in road-associated culverts. During the spring, summer and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. It is unknown what type of habitat would be used for summer roosting in the Black Hills NF, The Black Hills NF supports diverse habitats that would be suitable for the species such as Ponderosa pine woodlands, mixed woodlands, and deciduous riparian areas.

The active, inactive, pup-rearing, and reproduction periods for this species are not yet defined by the USFWS, but we would assume it to be similar to the Northern long-eared bat. The roosting ecology for this species in the Black Hills in unknown since they have never been tracked to a roost.

In recent years the species has undergone a range wide population decline due to white-nose syndrome, with many locations seeing population drops of 90% and some localized extirpations.

Threats and Risk Factors

The primary risk factor for tricolored bat is white nose-syndrome. First documented in the U.S. in 2006, it has now spread across this bat species' entire range.

Like other bat species, loss access of winter hibernacula, human disturbance in caves/mines, climate change, wind energy, and habitat loss can also be a risk factor (USDI Fish and Wildlife Service 2023e).

Red knot (*Calidris canatus rufa*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

Red knot is not currently known to exist in the plan area. However, the Fish and Wildlife Service, via the Integrated Planning and Consultation web application, has requested that the Forest Service analyze potential affects to the species. This can include off-site impact resulting from forest management or impacts to potential habitat within the plan area.

In this case, the species occurs within the Platte River drainage including tributaries and associated wetlands and reservoirs. Off-site impacts from the management of the forest to downstream areas will be analyzed in the plan's Environmental Impact Statement, the Biological Analysis and Biological Opinion.

Ecological Requirements, Current Condition and Trends

The species is a wading shorebird, preferring muddy shallows, sand spits, small islets and the like. Much of the habitat in the Platte River system is migratory stopover as the birds migrate from South America to the Canadian arctic, although some individuals and small groups may remain throughout the summer. Within inland migratory stopover areas inland saline lakes are preferred (USDI Fish and Wildlife Service 2023d).

Threats and Risk Factors

Primary threats to the species are overharvesting of horseshoe crabs in coastal areas. Secondary impacts may occur at the bird's overwintering areas in South America or in the

Canadian arctic. Within the Platte River system, potential impacts would include draining or elimination of small lakes, wetlands, and other preferred shallow water habitat, or threats to water quality or aquatic invertebrate population.

Monarch butterfly (*Danaus plexippus*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

There are six records of this species in the plan area, all from the Hell's Canyon and Mystic Ranger districts. Monarchs have undergone a severe range-wide population decline, local populations may have been impacted by this.

Ecological Requirements, Current Condition and Trends

The primary limiting factor in Monarch populations appears to be secure over wintering sites in Mexico and California. Within the plan area access to nectar producing flowering plants (for adult nutrition) and milkweed (caterpillar host species) are key.

The population trend within the plan is not known, but it is assumed to mirror the range wide trends.

Threats and Risk Factors

Risk factors for monarch include loss or damage to overwintering sites in California and Mexico. Inappropriate use of insecticides can harm the species. Range management that favors grass/ wind-pollinated monocot species over nectar producing dicots can be detrimental to monarch and many other pollinator species.

Other risk factors include drought, conversion of wildland and agricultural lands to housing developments, and possibly climate change (USDI Fish and Wildlife Service 2023b).

Leedy's Roseroot (*Rhodiola integrifolia* ssp. l*eedyi*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

There is one known location of this species in the plan area, at Black Elk Peak. Nationwide the species is only know from seven different locations in three states (southeastern Minnesota, western New York and the Black Hills of South Dakota).

Ecological Requirements, Current Condition and Trends

Leedy's roseroot is restricted to cool seeps in rocks (Moran 2009). It occurs on north to east-facing talus slopes or cliffs where ground water or cool air seeps from between the rocks, maintaining a cool, wet environment throughout the summer (NatureServe 2023). It grows in crevices usually on the lower portion of cliffs and under overhangs (Mattingly and Leopold 2017). In the plan area it grows on a seepy, granite cliff. Heavy rain or other disturbance events can dislodge an occasional plant.

Threats and Risk Factors

Leedy's roseroot is of conservation concern across its range due to its very specific habitat requirements, disjunct occurrences, and small population sizes (NatureServe 2023). Threats include erosion, rock-fall, groundwater contamination and hydrologic alteration (NatureServe 2023). Low genetic variation and inbreeding depression may also threaten the persistence of these small, isolated populations of Leedy's roseroot (Olfelt et al.1998). Climate change, drought and wildfire are additional threats to the Black Hills population (USFWS 2015).

Ute ladies'-tresses (*Spiranthes diluvualis*)

Distribution, Abundance, Demographics and Population Trends on the Black Hills National Forest

This species is not known to occur in the plan area. It is possible that the species is present but undetected. The USFWS has requested that the Forest Service analyze potential impacts to the species from the plan revision. This could include impacts to potential habitat or off-site impacts caused by forest management.

Ecological Requirements, Current Condition and Trends

This species of orchid is known to grow in calcareous wetlands. They prefer habitat in early seral stages along the edges of these wetlands (areas with calcareous soils often remain in relatively early seral stages due to soil conditions). Seasonal flooding or grazing can also help maintain habitat in these conditions.

The species depends upon pollinators but can only use a few species of them – which are themselves in decline.

Threats and Risk Factors

Drought can be a risk factors for wetland species, as can any activity that drains or fills in wetlands (such as road or building construction). Loss of pollinator species such as bumblebees can halt reproduction. Improper cattle grazing can place the species at risk due to direct consumption by animals or by soil disturbance/trampling of the muddy areas in wetlands.

Grazing and haying/mowing activities can be either harmful or beneficial to the species depending upon when and how the activity is carried out.

Recreational activities that churn up soil (such as mountain biking and off-road vehicle use) can also be destructive to this orchid species (Montana Field Guides 2023).

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APPENDIX 2. NATURESERVE RANK DEFINITIONS

Global (G) Conservation Status Ranks

Rank	Definition
GX	**Presumed Extinct** (species) — Not located despite intensive searches and virtually no likelihood of rediscovery. **Presumed Eliminated** (ecosystems, i.e., ecological communities and systems) — Eliminated throughout its range, due to loss of key dominant and characteristic taxa and/or elimination of the sites and ecological processes on which the type depends.
GH	**Possibly Extinct** (species) or **Possibly Eliminated** (ecosystems) — Known from only historical occurrences but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or eliminated throughout its range.
G1	**Critically Imperiled** — At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	**Imperiled** — At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	**Vulnerable** — At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	**Apparently Secure** — At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	**Secure** — At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

National (N) and Subnational/State (S) Conservation Status Ranks

Rank	Definition
NX SX	**Presumed Extirpated**—Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. [equivalent to "Regionally Extinct" in IUCN Red List terminology]
NH SH	**Possibly Extirpated** – Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.
N1 S1	**Critically Imperiled -** At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
N2 S2	**Imperiled** — At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
N3 S3	**Vulnerable** — At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
N4 S4	**Apparently Secure** — At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
N5 S5	**Secure** — At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.