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Summary of Project Area

Affected Environment
The BHNF is situated within the Middle Rockies ecoregion, surrounded on all sides by the Great Plains ecoregion (Omernik & Griffith 2014). Referred to as an Island in the Plains, the Black Hills encompass an area of 5,121 square miles (approximately three million acres). The varied topography, geology, and climate result in a corresponding variety in plant communities, including such diverse elements as ponderosa pine (*Pinus ponderosa*) forests typical of the western mountains, grasslands typical of the Great Plains, and white spruce (*Picea glauca*) forests typical of the boreal north. Midwest hardwood types are represented by stands dominated by oak, ash, and elm. Approximately 30 percent of the plant taxa in the Black Hills have their primary ranges to the west, though Midwestern, eastern, and northern associated taxa are also significantly represented in the local flora (McIntosh 1931).

The Black Hills Community Inventory by the Nature Conservancy’s Midwest Conservation Science Center and the Midwestern Resources Center was the first systematic classification to describe the vegetation of the Black Hills by adopting the standardized National Vegetation Classification (Marriott et al. 1999, Marriott and Faber-Langendoen 2000). Although further refinement of the Black Hills Community Inventory is needed, approximately 70 native plant communities have been described in the Black Hills.

Because the potential treatment areas for the Black Hills Resilient Landscapes (BHRL) Project span across much of the Forest, the Black Hills National Forest in its entirety is considered the affected environment for this discussion.

The majority of plant species considered rare in the Black Hills are best described as boreal disjuncts (species that became isolated in the cooler, moister forest and riparian areas of the Black Hills as glaciers retreated and the Great Plains environment became established). The next closest populations of these species to the populations located in the Black Hills are generally found in Canada and the northeastern United States.

No Botanical Areas or Research Natural Areas are included in the Black Hills Resilient Landscapes Project Area. However, Botanical Areas and Research Natural Areas are located adjacent to the project area boundary and have potential to be impacted by proposed treatments. Potential impacts to these special designation areas are addressed later in this document.

There are eight sites (comprising approximately 550 acres) identified as montane grasslands which are recommended for conservation in the Survey and Mapping of Black Hills Montane Grasslands report (Marriott 2012). Approximately 440 of the 550 acres recommended for conservation are co-located with areas identified for treatment in the Black Hills Resilient Landscapes Project. Treatments proposed in these areas include commercial timber harvest, non-commercial thinning and pine removal from grasslands and aspen/oak stands, and fuels reduction. Potential impacts to these special designation areas are addressed later in this document.
Field Reconnaissance & Survey Information
There was no field reconnaissance or survey performed specifically for this project, though all botanical survey data available on the Black Hills National Forest were considered. Forest-wide survey specifically for Region 2 sensitive plant species and Black Hills National Forest species of local concern (SOLC) has occurred since 2001. Since this time, the list of Region 2 sensitive species has been revised several times and some current listed species may not have been considered in earlier surveys. The most recent list was effective as of July 13, 2017 (USDA Forest Service 2017). The information collected during botanical surveys has provided information on distribution and habitat associations for targeted species and has contributed to the effects analysis of the project alternatives. The focus of botanical surveys includes identifying and mapping community types and determining the probability of an area for supporting sensitive plant species, in addition to locating and recording sensitive plant species occurrences. Botanical surveys often occur in forested habitats, but also cover other habitats with high potential to support sensitive plant species, including riparian areas, wetlands, and meadows. Areas identified for focus during surveys have been determined by a combination of aerial imagery, topographic maps, local knowledge, and professional judgement during field reconnaissance. Less intensive surveys are also conducted in habitats with lower potential for supporting sensitive species. All botanical survey data is stored in the Black Hills National Forest plants database (USDA Forest Service 2016). Impacts and risks to sensitive plant species on the Forest were evaluated using the best available science and data.

Target Plant Species Found During Survey

R2 Sensitive Plant Species
Seven Region 2 sensitive plant species were reported to occur within BHRL treatment areas identified in Alternative A (action alternative) and five species were located adjacent to, or within close proximity to, potential treatment areas. See the Black Hills Resilient Landscapes Project Botany Biological Evaluation for analysis of impacts to these species.

Species of Local Concern (SOLC)
Species of Local Concern (SOLC) are plant, fish, and wildlife species (including subspecies or varieties) which are locally rare and do not meet the criteria for regionally sensitive status. These may include species with declining trends in only a portion of Region 2, or those which are important components of diversity in a local area. The local area for the purpose of this document is defined as National Forest System (NFS) lands within the Black Hills National Forest. To be eligible for designation as a Species of Local Concern, the species (or subspecies, variety, or stock) must be recognized through an established scientific process and must be known to occur on NFS lands within the Black Hills National Forest. The SOLC list was last revised in 2011 (USDA Forest Service 2011b). Table 1 lists all Black Hills plant SOLC and whether suitable habitat is present within the Black Hills Resilient Landscapes Project Area. It also documents the rationale for excluding any species from further analysis.
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Black Hills Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common maidenhair</td>
<td>Adiantum capillus-veneris</td>
<td>The single documented Black Hills occurrence is associated with warm springs at Cascade Creek in the southwestern Black Hills. Plants at Cascade Creek are found in moist to saturated areas on the streambank and in depressions and old channels on the adjacent floodplain. Plants also grow on vertical rock including a rock wall and concrete culvert. No other warm springs are known on Forest Service administered land in the Black Hills.</td>
</tr>
<tr>
<td>Leathery Grape-fern</td>
<td>Botrychium multifidum</td>
<td>Black Hills occurrences are found in open to shady areas, often on streambanks, gravel bars and old stream channels where water is no longer flowing on a permanent basis but still receive occasional water scouring disturbance. Seven of the eight sites are located in a concentrated area of the central core on igneous or metamorphic bedrock. The single site in the Bearlodge Mountains (WY) is along a small intermittent stream in a paper birch/hazelnut (Betula papyrifera / Corylus cornuta) community on sandstone substrate.</td>
</tr>
<tr>
<td>Southwestern Showy sedge</td>
<td>Carex bella</td>
<td>Black Hills occurrences are known from high elevations of the central granitic core in cool, moist, shaded white spruce forests often with paper birch and usually associated with large granite rock outcrops. Occurrences are in a concentrated area (within three square miles) in the Black Elk Wilderness.</td>
</tr>
<tr>
<td>Beaked Spikerush</td>
<td>Eleocharis rostellata</td>
<td>The single documented Black Hills occurrence is along Cascade Creek in the southwestern Black Hills. Plants occur on calcareous substrates in the year-round flows of warm spring water. No other warm springs are known on Forest Service administered land in the Black Hills.</td>
</tr>
<tr>
<td>Downy gentian</td>
<td>Gentiana puberulenta</td>
<td>All sites occur on the eastern side of the Black Hills (several in the vicinity of Rockerville, SD) on limestone substrates. Plants occur in dry to mesic grassland and forest transition habitats, often with patchy shrub cover of western snowberry (Symphoricarpos occidentalis) and leadplant (Amorpha canescens). Big blue-stem (Andropogon gerardii), a tall-grass species, is documented from all sites.</td>
</tr>
<tr>
<td>Broadlipped Twayblade</td>
<td>Listera convallarioides</td>
<td>Broadlipped twayblade occurs on rich humus in open woods and boggy meadows and prefers cool soil. It is considered a facultative wetland species in the Black Hills and has a high tolerance for anaerobic conditions. Plants are documented in saturated soils adjacent to creeks and springs in white spruce dominated forests. Occurrences are restricted to a 20 square mile area in the northern Black Hills, south of Lead, SD.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Black Hills Habitat</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Stiff Clubmoss</td>
<td>Lycopodium annotinum</td>
<td>Stiff clubmoss sites are located in the northern Black Hills and are associated with moist microhabitats within remnant boreal white spruce and paper birch/hazelnut communities.</td>
</tr>
<tr>
<td>Fivestamen miterwort</td>
<td>Mitella pentandra</td>
<td>Fivestamen miterwort occurs in moist white spruce and paper birch/hazelnut communities along small perennial and intermittent streams. Plants are found in mossy, moist to saturated areas. Known sites are in a concentrated area (ca. 7 square miles) in the vicinity of Tinton, SD and occur on both sides of the SD/WY border.</td>
</tr>
<tr>
<td>Alpine Mountainsorrel</td>
<td>Oxyria digyna</td>
<td>Black Hills occurrences are restricted to the central granitic core, in a concentrated area within the Black Elk Wilderness and adjacent Custer State Park. Plants occur on coarse-textured soils near steep, granite rock outcrops often in rocky gullies. Plants co-occur with southwestern showy sedge (SOLC) and/or great-spurred violet (R2 sensitive species) at some sites.</td>
</tr>
<tr>
<td>Arrowleaf Sweet Coltsfoot</td>
<td>Petasites frigidus var. sagittatus /Petasites sagittatus</td>
<td>Plants occur in moist to saturated wetland areas along drainages and seeps ranging from full sun to shady spruce forests, often with paper birch or aspen (<em>Populus tremuloides</em>).</td>
</tr>
<tr>
<td>Limber pine</td>
<td>Pinus flexilis</td>
<td>Black Hills occurrences are known from a 3 square mile area of the highest elevations of the central core (elevation 6,440 to 7,100 ft.). It occurs in both Custer State Park and BKF administered land within the Black Elk Wilderness. Black Hills sites are characterized by large granite rock outcrops. Individuals usually occur on northerly aspects often on open, rocky sites or partially shaded upper slopes with white spruce, ponderosa pine, and common juniper.</td>
</tr>
<tr>
<td>Northern Hollyfern</td>
<td>Polystichum lonchitis</td>
<td>Occurrences are concentrated in the northern Black Hills and Bearlodge Mountains and are associated with moist, often mossy, shaded to partially shaded, northerly-facing slopes, ravines and gulches on primarily limestone substrates. Dominant overstory is birch/hazelnut, sometimes with spruce, ironwood (<em>Ostrya virginiana</em>) or aspen and often with diverse shrub and forb components.</td>
</tr>
<tr>
<td>Greenleaf Willow</td>
<td>Salix lasiandra var. caudata</td>
<td>Greenleaf willow is considered a facultative wetland species in the Black Hills. There are currently three known occurrences of greenleaf willow which are located within the Project Area.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Black Hills Habitat</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Shining Willow</td>
<td><em>Salix lucida</em></td>
<td>willow in the Black Hills. All occurrences are on floodplains or stream banks ranging in elevation from 4,300 to 5,000 ft.</td>
</tr>
</tbody>
</table>

1Species presence known or suspected in or immediately adjacent to the project area.

2Potentially suitable habitat present in or immediately adjacent to the project area.

3Species not known or suspected to be present and with no suitable habitat present in the project area are not further evaluated because they would not be affected by project activities.

(=Salix lucida ssp. caudata) willow in the Black Hills. All occurrences are on floodplains or stream banks ranging in elevation from 4,300 to 5,000 ft.

Shining willow is considered a facultative wetland species in the Black Hills. There is only one recently located occurrence of shining willow known from the Black Hills. An additional historical (1913) location near Deadwood, SD has not been relocated and is assumed extirpated. The single central Black Hills site consists of two individuals and is in a dense *Salix* spp. shrubland floodplain along Rapid Creek at an elevation of 5,140 ft.
No further analysis is required for species not known or suspected to occur in the project area, and for which no suitable habitat is present. Table 1 above document the rationale for excluding a species from further analysis. Determinations for all other species are documented below in the Determinations section.

Analysis was conducted on the effects of the proposed action on plant Species of Local Concern (SOLC) known to occur, or for which potentially suitable habitat occurs, in the Black Hills Resilient Landscapes project area. This analysis considers management activities of the action alternative (Alternative A) and associated mitigation measures as set forth in the Black Hills Resilient Landscapes Project Environmental Impact Statement.

The following analysis is derived from surveys, professional knowledge, and the best available science. An effects analysis has been completed for species (and associated habitats) which have potential to be impacted by the proposed project. Nine plant SOLC are known to occur within the project area, and one additional species is not documented within the project area but has potential for suitable habitat presence. Effects have been analyzed for known plant SOLC populations and corresponding suitable habitat, as well as occurrences which may be present but have not been detected during survey. Extensive species accounts were prepared for the Black Hills National Forest Land and Resource Management Plant (Phase II Amendment) Final Environmental Impact Statement (USDA Forest Service 2005). This document tiers to the FEIS and information included in the following species accounts is partially derived from it. Due to the size of the project area, complexity of analysis, and the short time allotted in which to conduct analysis, the site specificity for analysis purposes was defined at the stand size. If a plant SOLC occurs within a potential treatment area, or stand, actions are assumed to directly impact the species present.

**Leathery Grape-Fern (*Botrychium multifidum*)**

**Habitat:** Leathery grapefern has been documented along streams, in old stream channels, and in small drainage bottom clearings in white spruce (*Picea glauca*) or paper birch (*Betula papyrifera*) dominated riparian zones, and has been documented on sites associated with natural disturbance such as gravel bars or old stream channels. Leathery grapefern usually occurs in areas with relatively thick moss cover (USDA Forest Service 2016, USDA Forest Service 2014).

**Species Distribution, Status, and Trend:** Leathery grapefern is a circumboreal species documented across northern Eurasia, Greenland, and Canada. In the United States it occurs in Alaska, south to North Carolina, Colorado, Arizona, and California (Anderson 2005). There are eight known occurrences of leathery grapefern on the Black Hills National Forest, seven of which are located within the Black Elk Wilderness Area and Norbeck Wildlife Preserve on the Hell Canyon Ranger District. The other is found in the Bear Lodge Mountains on the Bearlodge Ranger District (USDA Forest Service 2016).

Leathery grapefern is currently ranked S3, rare and restricted in range, in Wyoming (Heidel 2012a, NatureServe 2015) and is ranked S1, critically imperiled, in South Dakota (SDGFP 2016). It has a global rank of G5, secure (NatureServe 2015).
According to the 2013 / 2014 monitoring report, the site in the Bear Lodge Mountains had been indirectly impacted by a winter storm which bent much of the understory closer to the ground, shading the area more than noted in the past. Surrounding vegetation had begun to encroach on the leathery grapefern site, although the population remains stable. The Bear Lodge leathery grapefern site is the only documented occurrence of the species located within the Project Area. Of the eight total known sites, four are described as persisting and four are reported to be in decline. Lack of scouring disturbance, beneficial to the species, is noted from most sites. Disturbances associated with mountain pine beetle mortality in trees adjacent to leathery grapefern occurrences have resulted in an increase in needles, branches, and trees falling into leathery grapefern occupied areas, negatively impacting habitat and occurrences. Mountain pine beetle mortality has also changed habitat conditions by opening canopies above or near leathery grapefern. In general, the leathery grapefern population on the Forest appears to be declining, a result of surrounding vegetation (including non-native or invasive plants) encroaching and out-competing the species, and habitat changes with forest succession creating less suitable conditions (USDA Forest Service 2014).

**Project Review:** Areas identified in Alternative A for potential commercial treatment are not co-located with, nor located within close proximity to, the single known leathery grapefern site occurring in the project area. The leathery grapefern site is not in the vicinity of any other actions proposed in Alternative A. Other areas of suitable habitat for leathery grapefern, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Southwestern Showy Sedge (Carex bella)**

**Habitat:** In the Black Hills, reported southwestern showy sedge occurrences are found in cool moist white spruce or paper birch forests among granitic outcrops or bouldery areas of low order streams (uppermost portions of high elevation Black Hills watershed streams). The occurrences are located at some of the highest elevations in the Black Hills (between 6,600 and 7,100 feet), which are considered low elevations for occurrences of this species from the main extent of its range (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Southwestern showy sedge is primarily found in Mexico and the southwestern United States (Arizona, California, Colorado, New Mexico, Utah), but does extend north into Nevada, South Dakota, and Wyoming (Ball & Reznicek 2003). There are five documented occurrences of southwestern showy sedge on the Black Hills National Forest, located within a three square mile area in the Black Elk Wilderness and outside of the project area boundary. Several additional sites are reported from nearby Custer State Park (USDA Forest Service 2014, USDA Forest Service 2016).

In South Dakota, southwestern showy sedge is assigned a rank of S1, critically imperiled (SDGFP 2016) and is unranked in Wyoming (Heidel 2012a, Heidel 2012b). Global rank is G5, demonstrably secure (NatureServe 2015).

The 2013 / 2014 monitoring report describes the five southwestern showy sedge sites as appearing stable, with recommendation to monitor impacts from leaf-eating insects. Insect
Project Review: Southwestern showy sedge is not documented as occurring within the project area boundary. Treatments could occur in, or adjacent to, areas with similar habitat characteristics which may be capable of supporting the species. Suitable habitat for southwestern showy sedge, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Downy Gentian (Gentiana puberulenta)**

**Habitat:** In the Black Hills, downy gentian occurrences are reported on limestone substrates in dry to mesic grasslands and in transition zones between grassland and forest. Elevations range from 3,960 to 4,480 feet and are restricted to the eastern edge of the Forest (USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Downy gentian has been documented across central North America, from Canada to Louisiana, and is considered rare across much of its North American range (NatureServe 2015). Ten sites are currently known in the Black Hills on National Forest System lands, with report of additional sites located on private property (USDA Forest Service 2014).

Downy gentian is assigned a rank of S4?, apparently secure, in South Dakota (SDGFP 2016) and is unranked in Wyoming (Heidel 2012a, Heidel 2012b). It has a global rank of G4G5, apparently secure to demonstrably secure (NatureServe 2015).

Downy gentian was added to the Black Hills National Forest Species of Local Concern list in 2011. Observations over the 2013 / 2014 monitoring period established baseline data, so comments pertaining to the species’ trend in the Black Hills will not be available until multiple site re-visits are completed over several years. Downy gentian presence was noted at each of the sites visited, and non-native or invasive plant species were observed at all sites. Unauthorized motorized vehicle use reportedly affected individuals directly at one site, and evidence of motorized use was noted at another site. Preliminary observations identify competition from non-native or invasive species as the largest threat to downy gentian on the Forest (USDA Forest Service 2014).

**Project Review:** Two downy gentian sites are co-located with areas identified in Alternative A for potential commercial treatment. Five additional downy gentian sites are located adjacent to, or within close proximity of, potential treatment areas. Downy gentian sites are co-located with areas identified as grasslands, and adjacent to areas identified as mixed aspen and oak, and oak; areas with potential to receive treatments removing pine. Several sites are located within areas
identified for potential fuel treatments and prescribed fire. Other areas of suitable habitat for downy gentian, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Broadlipped Twayblade (Listera convallarioides)**

**Habitat:** Broadlipped twayblade is considered a facultative wetland species in South Dakota and eastern Wyoming and occurs on rich humus in open woods and boggy meadows rangewide. It is often associated with cool soils (Magrath & Coleman 2002) and has a high tolerance for anaerobic conditions. Individuals on the Black Hills National Forest are growing in saturated soils adjacent to springs, and located under tree overstories dominated by white spruce. Elevations in the Black Hills range from 5,100 to 6,100 feet (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Broadlipped twayblade occurs across North America, particularly in the western and eastern portions of Canada and the United States. US occurrences are documented in the western third of the country and continue to the northeast states via a corridor through South Dakota, Minnesota, Wisconsin, and Michigan. Four broadlipped twayblade sites are currently known in the Black Hills on National Forest System lands, located within a 20 square mile area south of Lead, SD (USDA Forest Service 2014).

Broadlipped twayblade is assigned a rank of S1, critically imperiled, in South Dakota (SDGFP 2016) and S1S2, critically imperiled to imperiled, in Wyoming (Heidel 2012a). Global rank is G5, demonstrably secure (NatureServe 2015).

According to the 2013 / 2014 monitoring report (USDA Forest Service 2014), all populations of broadlipped twayblade are persisting and appear stable. Non-native or invasive plants are noted from the vicinity of all four broadlipped twayblade sites. Though no livestock associated impacts were observed impacting broadlipped twayblade over the latest monitoring period, livestock presence continues to present potential threats to the species and its habitat. Heavy rain events present the potential to impact at least one broadlipped twayblade site, largely via sediment deposition and/or alteration of shallow-channel streamflow. Non-native or invasive plant species competition appears to be the largest current threat to the species on the Black Hills National Forest.

**Project Review:** One broadlipped twayblade site is co-located with an area identified in Alternative A for potential commercial treatment. One additional broadlipped twayblade site is located adjacent to a potential treatment area. Another site is located within a Botanical Area, Management Area 3.1, and not included in the project area boundary. The fourth site occurs partially in the project area and extends outside of the project area boundary. The three broadlipped twayblade sites in the project area are co-located with areas identified for potential fuel treatments. Other areas of suitable habitat for broadlipped twayblade, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.
Stiff Clubmoss (*Lycopodium annotinum*)

**Habitat:** In the Black Hills, occurrences of stiff clubmoss are associated with high moisture microhabitats within remnant boreal white spruce and paper birch / beaked hazelnut (*Betula papyrifera* / *Corylus cornuta*) communities. These are sheltered microsites that are considerably cooler and more moist than surrounding areas. Black Hills documented sites occur at elevations ranging from 4,900 to 6,300 feet (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Stiff clubmoss is widespread throughout the boreal regions of North America from Greenland to Alaska. It extends south in the Rocky Mountains to Arizona and New Mexico, and also occurs in the Appalachians south to Kentucky and North Carolina (Wagner & Beitel 1993). There are ten occurrences of stiff clubmoss documented on the Black Hills National Forest, distributed across the Bearlodge, Mystic, and Northern Hills Ranger Districts.


According to the 2013 / 2014 monitoring report (USDA Forest Service 2014), the monitored sites of stiff clubmoss appear to be stable, with the exception of one site. Alteration of a boundary fence in 2007 resulted in livestock channeling through a stiff clubmoss site (LYAN2-4). Although the placement of logs and slash around the area supporting stiff clubmoss appears to have successfully prevented further livestock access, no occurrences of stiff clubmoss have been observed at the site since initial impacts occurred in 2007 and the site is presumed extirpated. Livestock impact and observed changing habitat conditions appear to present the largest potential impacts to stiff clubmoss on the Black Hills National Forest.

**Project Review:** One stiff clubmoss site is co-located with an area identified in Alternative A for potential commercial treatment. Four additional stiff clubmoss sites are located adjacent to, or within close proximity of, potential treatment areas. Stiff clubmoss sites are located within areas identified as mixed aspen and oak, and adjacent to areas identified as grasslands; areas with potential to receive treatments removing pine. Several sites are located within areas identified for potential fuel treatments. Other areas of suitable habitat for stiff clubmoss, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

Fivestamen Miterwort (*Mitella pentandra*)

**Habitat:** In the Black Hills, fivestamen miterwort occurrences are found growing in mossy, moist to saturated soils adjacent to perennial and intermittent streams in white spruce and paper birch / hazelnut communities (USDA Forest Service 2014, USDA Forest Service 2016). Fivestamen miterwort sites in the Black Hills range from nearly full sun exposure to nearly full shade. Black Hills occurrences are reported within elevations ranging from 5,280 to 6,280 feet.

**Species Distribution, Status, and Trend:** Fivestamen miterwort is widely distributed across western North America from Alaska to California and reaches its eastern-most extent in the
Black Hills of South Dakota (Wells & Elvander 2009). There are eight documented occurrences of fivestamen miterwort on the Black Hills National Forest, all located within a ten square mile area in the vicinity of Tinton, SD.

Fivestamen miterwort is assigned a rank of S1, critically imperiled, in South Dakota (SDGFP 2016) and S3S4, rare with a restricted range to apparently secure, in Wyoming (Heidel 2012a, NatureServe 2015). Global rank is G5?, demonstrably secure (NatureServe 2015).

The 2013 / 2014 monitoring report (USDA Forest Service 2014) noted livestock impacts and non-native or invasive plant presence at all sites visited over the monitoring period. Three sites were visited in 2013 and two sites were visited in 2014. The species was added to the Black Hills National Forest Species of Local Concern list in 2011, so trend determinations were limited during the latest monitoring period. In general, the population of fivestamen miterwort on the Black Hills appears stable. However, impacts from livestock activity and mining are perceived to present the largest potential impacts to fivestamen miterwort and will continue to be monitored to ensure the future stability of the species.

**Project Review:** One fivestamen miterwort site is co-located with an area identified in Alternative A for potential commercial treatment. Two additional fivestamen miterwort sites are located adjacent to, or within close proximity of, potential treatment areas. Fivestamen miterwort sites are co-located with areas identified as grasslands, and mixed aspen and oak; areas with potential to receive treatments removing pine. Several sites are located within areas identified for potential fuel treatments. Other areas of suitable habitat for fivestamen miterwort, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Arrowleaf Sweet Coltsfoot** (*Petasites frigidus* var. *sagittatus*)

**Habitat:** Arrowleaf sweet coltsfoot is considered a facultative wetland species in the Great Plains Region. South Dakota reports of the species are from the Black Hills and habitats display a variety of associated conditions: open to partial shade in dry to wet meadows along streams with saturated soils at elevations from 5,100 to 6,600 feet. White spruce, ponderosa pine, and quaking aspen (*Populus tremuloides*) are documented at sites with a variety of willow (*Salix*) species at most sites (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Arrowleaf sweet coltsfoot occurs in Alaska, across Canada and the northern United States from Washington to Michigan and south to Colorado and Utah (Bayer et al. 2006). There are ten documented occurrences of arrowleaf sweet coltsfoot on the Black Hills National Forest, reported from Hell Canyon, Mystic, and Northern Hills Ranger Districts. Black Hills occurrences range in elevation from 5,080 to 6,600 feet.

Arrowleaf sweet coltsfoot is assigned a rank of S2, imperiled because of rarity, in South Dakota (SDGFP 2016) and S2, imperiled, in Wyoming (Heidel 2012a, NatureServe 2015). Global rank is G5, demonstrably secure (NatureServe 2015). All ten occurrences of arrowleaf sweet coltsfoot were visited over the 2013 / 2014 monitoring
period and were described as persisting and apparently stable (USDA Forest Service 2014). Competition from non-native and invasive plants and impacts associated with livestock use were described as presenting the largest potential threats to the species. Evidence of livestock presence was noted in the vicinity of six monitored sites, with direct impacts to arrowleaf sweet coltsfoot reported at two sites. Non-native or invasive plants were observed within the vicinity of all sites visited.

**Project Review:** One arrowleaf sweet coltsfoot site is co-located with an area identified in Alternative A for potential commercial treatment. Seven additional arrowleaf sweet coltsfoot sites are located adjacent to, or within close proximity of, potential treatment areas. Arrowleaf sweet coltsfoot sites are co-located with areas identified as grasslands, mixed pine and aspen, and mixed aspen and oak; areas with potential to receive treatments removing pine. Several sites are located within areas identified for potential fuel treatments. Other areas of suitable habitat for arrowleaf sweet coltsfoot, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Northern Hollyfern (Polystichum lonchitis)**

**Habitat:** In the Black Hills, northern hollyfern is commonly associated with rock crevices and gulches. Over 20 sites are currently known from the Black Hills on National Forest System lands in the northern Black Hills and Bear Lodge Mountains. Elevations range from 4,300 to 5,600 feet. Individuals grow in mossy, moist soils. Populations are found in shaded to partially shaded sites and occur on north-facing limestone slopes (USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Northern hollyfern is distributed across western and eastern Canada and south into the western United States. Populations are also found around the Great Lakes region (Wagner 1993).


The 2013 / 2014 monitoring report describes the visited northern hollyfern occurrences as apparently stable with similar levels of disturbance as observed in the past (USDA Forest Service 2014). Monitoring data indicate livestock activity is the largest potential threat to the species on the Black Hills National Forest. Due to the few numbers of individuals reported from most sites, northern hollyfern occurrences may be susceptible to eradication by single disturbance events.

**Project Review:** Two northern hollyfern sites are co-located with areas identified in Alternative A for potential commercial treatment. Three additional northern hollyfern sites are located adjacent to, or within close proximity of, potential treatment areas. Northern hollyfern sites are co-located with areas identified as mixed aspen and oak, and adjacent to areas identified as grasslands; areas with potential to receive treatments removing pine. Several sites are located within and near areas identified for potential fuel treatments. Other areas of suitable habitat for northern hollyfern, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.
Greenleaf Willow (Salix lasiandra var. caudata)

**Habitat:** Greenleaf willow is part of a group of loosely defined species that are usually distinguishable by geography. The species is usually associated with floodplains, wet meadows, and riparian areas (Eckenwalder 2010). The three confirmed Black Hills populations all occur along streambanks or floodplains and are located between 4,260 to 5,620 feet (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Greenleaf willow is widely distributed across western North America and reaches its eastern limit in the Black Hills (Eckenwalder 2010).

Greenleaf willow is currently ranked S1, critically imperiled, in South Dakota (SDGFP 2016) and S3S4, rare with a restricted range to apparently secure, in Wyoming (Heidel 2012a, Heidel 2012b). Global rank is G5, demonstrably secure (NatureServe 2015).

The 2013 / 2014 monitoring report describes the greenleaf willow population as stable, but threatened by lack of regeneration and dependant upon the success of transplant efforts (USDA Forest Service 2014). Non-native or invasive plant species were reported at all of the greenleaf willow sites. One site in particular was noted as appearing decadent, with no evidence of regeneration.

**Project Review:** One greenleaf willow site is co-located with an area identified in Alternative A for potential commercial treatment. One additional site is located adjacent to a potential treatment area. Greenleaf willow sites are co-located with areas identified as grasslands, and adjacent to stands identified as mixed aspen and oak; areas with potential to receive treatments removing pine. Several sites are located within areas identified for potential fuel treatments. Other areas of suitable habitat for greenleaf willow, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

Shining Willow (Salix lucida)

**Habitat:** Shining willow is part of a group of loosely defined species that are usually distinguishable by geography. The species is generally associated with floodplains, wet meadows, and riparian areas (Eckenwalder 2010). Shining willow is considered a facultative wetland species in the Black Hills. There is one site, consisting of two individuals, known from the Black Hills, with an additional historical report (1913) that is likely extirpated. The single occurrence is located in a dense willow shrubland along the floodplain of Rapid Creek at an elevation of 5,140 (USDA Forest Service 2014, USDA Forest Service 2016).

**Species Distribution, Status, and Trend:** Shining willow occurs across eastern Canada and the northeastern United States. The species extends south to Virginia and Kansas, and reaches its western limit in Saskatchewan, North Dakota, and the Black Hills.

Shining willow is assigned a rank of S1, critically imperiled, in South Dakota (SDGFP 2016) and

The 2013 / 2014 monitoring report describes the population of shining willow as apparently healthy and stable, though decadent with no evidence of regeneration (USDA Forest Service 2014). Non-native or invasive plants were observed from the vicinity of the occurrence, and a heavily-used public trail (Mickelson Trail) passes nearby. A placer mining claim is located in the vicinity of the shining willow occurrence. Although the population of shining willow on the Black Hills National Forest is currently stable, with only two individuals located within a one acre area, a single disturbance event could potentially remove the population from the Planning Area.

**Project Review:** The single known shining willow site is not located within or near areas identified in Alternative A for potential commercial treatment. The site is located adjacent to an area identified as a grassland, which has potential to receive treatments removing pine. The shining willow site is located within an area identified for potential fuel treatments. Other areas of suitable habitat for shining willow, and possibly undocumented individuals, may occur within the project area and have potential to be impacted by actions associated with Alternative A.

**Suitable Sensitive Plant Habitat**

Although a majority of treatment areas identified in the Black Hills Resilient Landscapes Project are primarily ponderosa pine forests, treatments are also proposed in areas containing spruce, hardwoods, and grasslands. Associated activities, including road construction and maintenance, log decking, and debris piles, have potential to occur outside of identified treatment areas. The Design Criteria for the Black Hills Resilient Landscapes Project include a requirement to consult with a qualified (0430 series) botanist for review of any activities occurring beyond treatment areas if the activities will impact suitable sensitive plant habitat. For the purposes of this document, suitable sensitive plant habitat refers to habitats suitable for supporting plant Species of Local Concern. These are the same habitats which are known, or have potential, to support Region 2 sensitive plant species. Following is a general description of suitable sensitive plant habitat.

**White Spruce Habitat**

The Black Hills has one of the southern-most populations of white spruce (*Picea glauca*) in the United States. White spruce is the most shade-tolerant of the Black Hills tree species, enabling regeneration and growth under closed canopy conditions. The cool, moist environments of white spruce stands provide habitat diversity in an otherwise ponderosa pine dominated landscape. Several plant SOLC are associated with white spruce communities, including broadlipped twayblade, stiff clubmoss, fivestamen miterwort, arrowleaf sweet coltsfoot, and northern hollyfern (USDA Forest Service 2016, USDA Forest Service 2014).

**Hardwood Habitat Including Paper Birch and Bur Oak**

Paper birch/Hazelnut (*Betula papyrifera/Corylus cornuta*) Forest occurs in drainage bottoms with and without streams and on northerly slopes. In the northern Black Hills where precipitation
is higher and temperatures are cooler, Paper birch/Hazelnut Forest extends to lower elevations. Stands of this type are found in mesic habitats such as shaded, narrow gulches and north-facing slopes. Paper birch/Hazelnut Forest often transitions into Bur oak/Ironwood (Quercus macrocarpa/Ostrya virginiana) Forest in Black Hills drainages at lower elevations. A number of boreal disjunct plant species, including some plant SOLC, occur in stands of cool, moist Paper birch/Hazelnut Forest and Bur oak/Ironwood Forest. Southwestern showy sedge, stiff clubmoss, fivestamen miterwort, arrowleaf sweet coltsfoot, and northern hollyfern are known to occur in these habitats (USDA 2016, USDA Forest Service 2014).

**Riparian Habitat Including Wetlands and Fens**

Riparian areas are lands which interface between water and drier uplands. They are an ecologically diverse habitat and provide bank stability, sediment filtering, streamside shading, and nutrient input into streams and lakes. Riparian areas are generally located along perennial and intermittent streams. Approximately 2,108 miles of intermittent and perennial streams occur on Black Hills National Forest lands (BHRL Watershed Report 2017).

Many plant SOLC in the Black Hills are associated with wetland and/or riparian areas, including leathery grapefern, broadlipped twayblade, fivestamen miterwort, arrowleaf sweet coltsfoot, northern hollyfern, shining willow, and greenleaf willow. Consequently, management protective of general riparian and wetland habitat and processes is an important component of protection for native plant species and communities, including plant SOLC. Inventory completed by the US Fish and Wildlife Service has documented approximately 3,981 acres of wetlands occurring on Black Hills National Forest lands (USDI Fish and Wildlife Service 1995).

**Fens**

In Region 2, a fen is defined as an ancient wetland with continuous organic soil accumulation of 16 inches or more, with perennial support from ground water, and consistent saturation throughout the year (Austin 2005). They are classified as groundwater dependent ecosystems. Fens occur where settings provide a highly specific balance between climatic conditions, bedrock lithology, constant ground water flow, and where natural barriers contribute to maintaining saturated conditions (Bedford & Godwin 2003). Many fens in Region 2 are known to be 6,000 to 10,000 years old, and often support sensitive plant species. Due to the slow rate of peat accumulation and specificity of ecological requirements, fens are difficult to reclaim and deemed essentially irreplaceable (USDA Forest Service 2011a). Approximately 25 fens are believed to have been verified on the Black Hills National Forest, largely occurring on the Mystic Ranger District but also located on Northern Hills and Hell Canyon Ranger Districts (USDA Forest Service 2010). Other areas have been identified as potential fens and have yet to be surveyed to confirm or deny the classification.

The Regional Watershed Conservation Practices (WCP) Handbook contains standards used when conducting activities in riparian, water influence zones, and wetlands as does the Forest Plan (Standards 1306 and 3106).
Meadows
A meadow is a tract of grassland or a low area near a river. Meadows can be considered riparian habitat, but not all riparian habitat is classified as a meadow. Meadows occur across the Forest at various elevations. A unique type of meadow endemic to the Black Hills is the Montane Grassland. Impacts to Black Hills Montane Grasslands are discussed in the Black Hills Resilient Landscapes Project Botany Report. Several plant SOLC, including, but not limited to, downy gentian, and arrowleaf sweet coltsfoot, occur in meadow habitats.

Guideline 4111 in the Forest Plan recommends slash piles scheduled for burning to be located outside of meadows that contribute to the Waters of the United States and that a buffer should be established to keep sediment, ash, and debris out of these channels.

Effects of the Alternatives

For the purpose of this analysis, cumulative effects are bound in space by the Forest boundary since this is the area affected by Forest Service management decisions and which contains actions proposed by the project. Cumulative effects are bound in time by twenty years (ten years prior and ten years into the future) because this encompasses the impacts related to the most recent planning efforts and the foreseeable impact of the Black Hills Resilient Landscapes Project.

Past, present, and foreseeable vegetation projects include timber sales which have occurred over the past ten years, those currently in progress, and those which are in the planning phase across all districts of the Forest. The Forest contains 133 grazing allotments located with the project area (BHRL Project Range Report).

There was no field reconnaissance or survey performed specifically for this project, though all botanical survey data available on the Black Hills National Forest were considered. Forest-wide survey specifically for Black Hills National Forest plant species of local concern (SOLC) has occurred since 2001. Since this time, the plant SOLC list of has been revised several times and some current listed species may not have been considered in earlier surveys. The most recent list was effective as of June 2011 (USDA Forest Service 2011b). The information collected during botanical surveys has provided information on distribution and habitat associations for targeted species and has contributed to the effects analysis of the project alternatives. The focus of botanical surveys includes identifying and mapping community types and determining the probability of an area for supporting plant SOLC, in addition to locating and recording plant SOLC occurrences. Botanical surveys often occur in forested habitats, but also cover other habitats with high potential to support plant SOLC, including riparian areas, wetlands, and meadows. Areas identified for focus during surveys have been determined by a combination of aerial imagery, topographic maps, local knowledge, and professional judgement during field reconnaissance. Less intensive surveys are also conducted in habitats with lower potential for supporting plant SOLC. All botanical survey data is stored in the Black Hills National Forest plants database (USDA Forest Service 2016). Impacts and risks to plant SOLC on the Forest were evaluated using the best available science and data.

The majority of forested landscapes on BHNF have received survey for botanical resources,
either through contracted survey, Forest Service botanist survey, or field review in support of projects occurring across all Forest districts. It is recognized that plant SOLC are not always observed when present, even in areas where botanical survey has occurred. In some cases, plants may not be in an identifiable growth stage, they may be in dormancy, or may be difficult to see among surrounding vegetation.

Assumption for Analysis
- All figures are approximate
- Actual acres/miles implemented would depend on weather, priorities, funding, and other factors
- Mapped stand boundary locations are approximate. Stand structure determinations are preliminary. Stand delineation and structure are subject to corrections based on field review.
- Areas that have not been surveyed for botanical resources are occupied (as directed in FSM_R2_2670_2017-1)

Analysis of Effects of the Proposed Action (Alternative A)

Direct and Indirect Effects: Nine plant SOLC were located in the area designated for treatment in Alternative A (action alternative), and one other species was determined to have suitable habitat within designated treatment areas (Table 1). Habitats most likely to support the species analyzed for in this project include moist and shaded white spruce-dominated slopes, moist to mesic hardwood stands, drainages with spruce and/or hardwoods, grasslands, and riparian areas. Some species are known to occur beyond these areas, but generally as outlier individuals.

Fuel Reduction and Prescribed Fire
Locations identified for potential fuel reduction and/or prescribed fire to occur include portions of most of the types of habitat with higher suitability for supporting plant SOLC. Areas identified as aspen, oak, pine/aspen mix, aspen/oak mix, and grasslands for the BHRL project analysis equal around 250,000 acres in the project area. Fuel treatments could occur across approximately 1/3 (82,000 acres) of these communities. Identification and extent of hardwoods, grasslands, and fuels GIS files are preliminary and approximate, but this provides some estimates on the acres of these habitats potentially subject to fuel treatments.

Actions associated with fuel treatments involve thinning tree densities (generally ponderosa pine) and assorted methods of addressing the produced woody material, including piling, lop and scatter, and shredding or chipping. Objectives may be achieved manually (by hand) or through the use of mechanized equipment. Mechanical fuel treatments, prescribed fire, and hazard tree removal as proposed in Alternative A would increase ecosystem resilience and reduce the potential for landscape-level wildfires. Fuel treatments have the potential to negatively impact plant SOLC by direct contact with fire or indirectly by increased exposure to sediment and ash via runoff. The effects of these impacts are largely determined by the frequency, intensity, and season of the fire, along with climatic patterns to include moisture availability and any other pre-fire stressors to vegetation. Areas supporting plant SOLC in the Black Hills are often associated with drainage bottoms, north-facing slopes, and spruce and/or hardwood overstories; typically areas with a higher soil moisture content where lower intensity burning would be expected.
Lower intensity fire related impacts to vegetation are considered short-term, present from the time burning occurs until approximately the following growing season. However, higher intensity burns have the potential to affect below-ground biomass and alter species composition, including a possibility of plant SOLC mortality. Aside from short-term negative impacts, prescribed fire can provide long-term benefits for understory vegetation, including plant SOLC. Long-term benefits may become apparent within several months of treatment implementation, by removal of non-native and/or invasive plant species, reduction in surrounding competition for resources, and removal of decadent growth-inhibiting grass and other vegetation. These benefits persist until the ecosystems again reach pre-implementation conditions, a time-frame which can be highly variable and driven by many factors (Neary et al. 1999). Fuel treatments help maintain a healthy amount of fuels on landscapes, reducing the risk of catastrophic wildfires. With heavier fuel loads, fire tends to smolder and move more slowly through affected areas, resulting in greater vegetative mortality than lower intensity fires (Neary et al. 1999). Fuel treatments provide the benefits of nutrient cycling, removal of decadent growth, and natural disturbance through a managed process. So, although proposed fuel treatments could impact individual plant SOLC and their habitat, the negative effects are determined to be short-term (generally one season), with more long-term benefits (5-15 years) becoming apparent soon after treatments occur.

**Enhancement of Hardwoods and Grasslands**

The project would cut encroaching pine from areas of hardwoods and grasslands to enhance these areas. Plant SOLC with higher potential to occur in hardwoods and grasslands include downy gentian, and arrowleaf sweet coltsfoot. Several other species have some potential to occur in these areas as well. The other four species analyzed for this project have lower potential to occur in these areas, though presence remains a possibility.

The action of removing pine and spruce from hardwood stands is capable of providing a benefit of retaining these stands as more suitable sensitive plant habitat. The impacts to plant SOLC associated with the action depend on the method used to achieve the result. Hand falling pine and/or spruce in these areas would cause the least amount of disturbance, still presenting the possibility of sensitive plants being crushed by falling trees or covered by dropped trees and debris.

Mechanical treatments to remove pine and/or spruce from hardwoods would result in more extensive impacts to the understory vegetation from wheeled or tracked heavy equipment passing through, as well as soil compaction and exposure of bare soil. These impacts have the potential to lower the suitability of the habitat for plant SOLC by altering the understory/furb community during the process of enhancing the overstory. Areas where pine and/or spruce are removed from the overstory will result in more sunlight reaching the understory, potentially creating a change in micro-habitats by increasing temperature and evapotranspiration. Impacts to mycorrhizal fungi in the soil could impact plant SOLC dependent upon relationships with these organisms.

An increase in sunlight and exposure of bare soil creates favorable conditions for non-native and/or invasive plant species migration to new areas. These species have potential to out-compete native plants and plant SOLC for resources and can alter species composition in areas to a point where it is no longer considered suitable sensitive plant habitat.
Removal of encroaching pine from grasslands would provide the benefit of retaining a site as a grassland, offering more habitat suitable for supporting certain plant SOLC. Impacts of the action to plant SOLC are similar to those discussed above (for hardwood enhancement), and would depend upon the method by which the result is achieved. Potential impacts from the action include crushing plant SOLC occurrences, covering plant SOLC with debris, and introduction or spread of non-native or invasive plant species.

**Pine Structural Stage Modification**

Actions included with pine structural stage modification include overstory removal, precommercial and/or POL thinning, patch cuts, tree planting, and mechanical site preparation. In general, pine forests are not considered highly suitable for supporting plant SOLC in the Black Hills. Some species are known to occupy pine stands, usually consisting of individuals on the periphery of the core occurrences located nearby within an inclusion of more suitable habitat (white spruce, aspen/birch, etc.). These inclusions of spruce and hardwoods within pine stands have potential to be impacted by activities occurring in surrounding or adjacent areas.

Heavy equipment associated with mechanical treatments can directly impact understory plants by crushing or uprooting, or by compacting soil or otherwise altering the forest floor. The equipment can also loosen and displace soil, which can then collect in drainages and other low-lying areas suitable for supporting plant SOLC. Microsite hydrology and fungal communities can be affected by heavy equipment to a point where plant SOLC (including leathery grapefern and broadlipped twayblade) could be inhibited from establishing.

Mechanical site preparation to promote the establishment of pine seedlings would result in exposing bare soil on up to 4,000 acres in open, mature pine stands. Although the action creates conditions favorable for pine establishment, it also provides opportunity for establishment and spread of non-native and/or invasive plant species. Once established in the mechanically prepared areas, these species have potential to spread into other nearby areas of suitable sensitive plant habitat.

Other potential indirect effects result from greater use of existing roads for hauling, resulting in an increase in erosion and dust pollution. Plant SOLC individuals that are not documented which occur along roads could experience reduced photosynthetic capacity due to a coating of dust on the leaves. Also, removal of timber may open access to areas previously protected from impacts by livestock and illegal off-road vehicle use. New use in areas increases not only the potential for unauthorized collecting, trampling, and other losses of individuals, but also increases the susceptibility of non-native or invasive plant species invasion.

**Connected Actions**

Supporting actions associated with proposed action include road construction (Specified: up to 17 miles, Temporary: up to 39 miles), reconstruction and/or maintenance for use of temporary roads on existing templates, road conversion (from unclassified to system designation), and creation of skid trails and slash piles. Roads and skid trails have the potential to alter ground surface by crushing and/or uprooting vegetation, compacting or otherwise altering soil, exposing bare soil, and introducing non-native and/or invasive plant species to an area. New road
construction is not proposed within 500 feet of any known plant SOLC occurrences.

Slash piles are often situated outside of pine stands, in open areas or on the periphery of grasslands/meadows. Multiple passings to these areas by heavy equipment can compact soil and devegetate pathways. Piles have the potential to be placed upon undocumented occurrences of plant SOLC. Piling of unused forest materials results in alteration of the site below via increased temperatures, blocking of sunlight and other resources, and general surface disturbance. Piles planned for burning result in high temperatures below and surrounding piles, and further surface disturbance. Although an approved seed mix is distributed across the affected area, non-native and/or invasive plant species commonly colonize these areas after burning (Haskins & Gehring 2004).

**Dust Abatement**

Use of dust abatement (water, magnesium chloride, calcium chloride, etc.) causes a decrease in airborne dust. Airborne dust can adhere to photosynthetic surfaces ultimately causing a decrease in the ability of an individual plant to grow. The addition of salt to dust abatement treatments allows the treatment to be effective for a longer period of time; however, high concentrations of ions in the soil matrix caused by the addition of magnesium chloride or calcium chloride can decrease plant growth and survival (Goodrich et al. 2009). These ions usually move down slope from treated roads, but impacts can be observed up slope and relate to application rate (Goodrich et al. 2008, Piatt and Krause 1974). The distance from treated road surface causing impacts to vegetation would increase with an increase in the surface area to which the treatment was applied, the application rate, and average precipitation (Goodrich et al. 2008, Goodrich et al. 2009). On average, chloride ions can move down slope from the site of application approximately six meters and magnesium can move three meters from application site regardless of the soil type (Goodrich et al. 2009).

Aspen (*Populus tremuloides*) growing down slope from application sites could show necrosis of leaf margins, crown damage, and mortality depending on the application rate and surface area treated upslope from the tree (Goodrich et al. 2009). In coniferous tree species, high concentrations of ions in needle tissue can cause an increase in susceptibility to agents such as fungus, insects, and mechanical damage caused by frost and snow (Goodrich et al. 2009). In grasses, germination generally decreases with increased concentration of magnesium ions present in the soil (Ryan et al. 1975).

**Impacts to Habitat**

Design Criteria require that consultation with a qualified, professional series botanist occur prior to ground disturbance in suitable sensitive plant habitat. The intent is that this consultation would minimize impacts to the habitat and any occurrences of Region 2 sensitive plant species or plant SOLC located in the potential habitat. If impacts of ground disturbance on suitable habitat cannot be avoided, the possible impacts to the habitat itself are discussed below. Impacts to plant SOLC are discussed separately.

**White Spruce**

Impacts to white spruce stands should be minimal because the treatment areas target ponderosa pine stands, hardwoods, and grasslands, although white spruce may be targeted for removal from
hardwood stands. Impacts to white spruce stands outside of treatment areas could occur if landings, log decks, roads, or debris piles need to be constructed in order to facilitate timber harvest. Ponderosa pine could potentially be removed from white spruce stands that are found within larger ponderosa stands. If either of these potential impacts to white spruce stands occurs, impacts to the habitat include removal of white spruce and damage to standing white spruce, including damage to root structures, during felling and removal of ponderosa pine. Road construction in white spruce habitat could alter the local hydrology, create a vector for non-native or invasive plant introduction, and create a source of erosion. In addition to the impacts discussed in the Dust Abatement section, use of chemicals can cause needle burn or mortality of white spruce along the road, particularly down slope and the risk increases with area treated, application rate and frequency, and distance from the treated surface (Goodrich et al. 2009). Changes in the overstory of white spruce stands would cause changes to the under and midstory, which in turn impact the habitat which certain plant SOLC require to survive.

**Hardwood Habitat Including Paper Birch, Aspen, and Bur Oak**

Impacts to hardwood habitats are discussed in the above section *Enhancement of Hardwoods and Grasslands*. Beyond what is noted there, impacts to this habitat include potential damage to standing hardwoods, including damage to root structures, during felling and removal of ponderosa pine and/or spruce. Changes in the overstory of hardwood stands would cause changes to the under and midstory, which in turn impact the habitat which certain Region 2 sensitive species and plant SOLC require to survive.

**Riparian Habitat Including Wetlands and Fens**

Plant species in wetlands, riparian areas, and seeps could be impacted by changes in hydrology and water quality. Roads that currently exist in the water influence zone of wetlands can cause increased erosion, which can modify stream bank geometry and cause an increase in overland flow. Increases in overland flow will have the net effect of maximizing runoff and minimizing infiltration. While the increased runoff results in overall greater water yield, the storm water is delivered relatively quickly through surface processes rather than through sustained subsurface flows, which are often critical to wetland hydrology (Moore et al. 2006). Impacts to fens specifically are discussed later in this document.

While direct impacts to riparian habitat are possible, moist soils and riparian areas are protected during timber harvest and new road-building on National Forest land under Best Management Practices and Forest Service Manual 2509.25. In addition to the impacts discussed in the Dust Abatement section, use of these chemicals can cause leaf necrosis or mortality of forbs and grasses along the road (Ryan et al. 1975), particularly down slope and the risk increases with area treated, application rate and frequency, and distance from the treated surface (Goodrich et al. 2009). Design Criteria prohibit the use of these chemicals within 500 feet of fens, which will decrease the impact on these wetlands.

**Meadows Including Black Hills Montane Grasslands**

Impacts to meadows are discussed in the above section *Enhancement of Hardwoods and Grasslands*. In general, landings, log decks, roads, or debris piles have potential to negatively impact meadows and plant SOLC within the habitat. Impacts to suitable plant habitat and/or the
unique plant community of Black Hills Montane Grasslands (montane grasslands) if these activities occur within meadows include loss of habitat, alteration of local hydrology, introduction of non-native or invasive plant species, and loss of montane grassland qualification. If ponderosa pine trees are removed from meadows, equipment used during harvest could crush or uproot vegetation as well as cause varying degrees of soil compaction. Road construction, conversion, or maintenance in meadows could crush, bury, remove, or uproot vegetation. Roads can also create erosion channels that further impact soil structure and moisture, both of which are qualities that make meadows habitat for some plant SOLC. In addition to the impacts discussed in the Dust Abatement section, use of these chemicals can cause leaf necrosis or mortality of forbs and grasses along the road (Ryan et al. 1975), particularly down slope and the risk increases with area treated, application rate and frequency, and distance from the treated surface (Goodrich et al. 2009). Changes in meadow habitat could alter the habitat quality such that certain Region 2 sensitive species and plant SOLC would no longer be able to survive.

Impacts to Special Designation Areas

Research Natural Areas, Wilderness Areas, and Botanical Areas would not receive direct impacts from the proposed action because they are not included in the project area boundary. Indirect impacts are possible since treatments are proposed in stands adjacent to these areas. Because these areas are not designated for treatment, impacts would be the same as those discussed in Alternative B (no action alternative). In addition, these areas could receive impacts similar to other areas surrounding treatment areas. However, impacts will be mitigated by applying design criteria, specifically the review of known botanical resource conflicts, by a qualified botanist prior to implementation.

Cumulative Effects: Past, current, and reasonably foreseeable actions within the Black Hills Resilient Landscapes Project Area are discussed in this section.

Activities such as vegetation management, fuels management, livestock grazing, recreational activities, and other management activities have occurred and will continue on the Forest. These activities will likely occur on private land as well. All may affect plant SOLC through direct mortality, habitat alteration, or spread of invasive species.

The annual impact to botanical resources on the Forest from timber harvest activities would remain comparable to previous years. Cumulative effects to botanical resources have the potential to increase with all new or recurring actions on the Forest, with effects ranging from null or minimal to significant. Stands are identified for treatment across the Black Hills National Forest in Management Areas identified in Table 1 (Management Areas) of the BHRL Botany Biological Assessment / Biological Evaluation Report. Most notably for botanical resources, treatments will not occur in Botanical Areas, Research Natural Areas, or Wilderness Areas, locations of higher density plant SOLC occurrences.

Actions associated with mechanical site preparation have the potential to increase the presence of non-native and/or invasive plants in the western portion of the Black Hills. Establishment of invasive species across the proposed acreage (up to 4,000 acres) may result in these species spreading to other areas where they would not have otherwise been as likely to reach. Non-native
and/or invasive plant species are capable of outcompeting native vegetation for resources and often are known to produce high quantities of seed which can be easily (and widely) dispersed with general requirements for propagation. The spread of non-native and/or invasive plant species can result in the alteration of plant communities and reduction in suitability of sensitive plant habitat.

Management of national and state parks adjacent to the Forest is assumed to have a similar effect on plant SOLC populations. Other federal, state, and private lands offer suitable habitat for plant SOLC.

Privately owned lands within the Black Hills Ecoregion may also provide suitable habitat, but resource management by companies and private citizens depends on a number of factors (e.g., desired goals, market prices, development potential) making it difficult to predict future trends in private habitat diversity and quality. Suitable habitat for plant SOLC may occur on private lands across the Black Hills. Further urban development in the Black Hills will likely continue to affect habitat, including white spruce communities and paper birch/hazelnut forest, thereby increasing the importance of stands on Forest Service lands.

**Analysis of Effects for the No Action Alternative (Alternative B)**

**Direct and Indirect:** Under Alternative B (no action) there would be no direct effects to botanical resources since implementation of elements of the proposed action would not occur. Ongoing forest management and recurring road maintenance on system roads would continue as directed by the Forest Plan. Timber harvest project areas generated by each District would continue as planned, as would analysis of future planned timber projects.

Alternative B would maintain plant SOLC habitat and protect biodiversity by not implementing actions with potential to impact these resources, though over time the forest would experience an increase in ponderosa pine, including further encroachment into stands of hardwoods, riparian areas, and grasslands. Structural stage objectives outlined in the Forest Plan may be addressed through other management, but not likely to the extent as proposed with the BHRL project.

**Cumulative:** If no action is taken, it is unlikely that Forest structural stage conditions will become aligned with the goals outlined in the Forest Plan. Managing for specific structural stage conditions had not been a primary focus during the mountain pine beetle epidemic. Cumulative impacts associated with no action include retention of large areas of monotypic stands which could become susceptible to mountain pine beetle epidemic in the future. Alternative B would also result in a decrease in landscape diversity, reduced health of hardwood stands, and a decrease in areas of grasslands unless these items were addressed through another management action. These conditions may trend toward concerns including decadent hardwood stands and grasslands, which may lower the suitability of these habitats for supporting plant SOLC.

**Effects Determination**

The determination of effects on plant SOLC were made as a result of the information gathered in the pre-field review, field reconnaissance, survey results, and effects analysis for the action.
The determinations were based on effects of proposed activities on known populations and impacts to populations that could occur in areas that are unsurveyed for all plant SOLC. The determination language is set forth in Forest Service Manual 2670.

Determinations consider the extent of each plant species’ distribution on the Forest and within the project area. Species may be limited in documented occurrences, located within a restricted range, have highly specific habitat requirements, or have a significant percentage of known sites located within, or within close proximity to, areas identified for potential treatment in Alternative A.

Objectives, standards, and guidelines have been identified in the Forest Plan Phase II to conserve plant SOLC located on the Black Hills National Forest. This project will follow the objectives, standards, and guidelines applicable to those species and habitats found in the Black Hills Resilient Landscapes Project Area.

The plant SOLC located in the BHRL project area are globally secure (NatureServe 2015). This, in combination with the rangewide presence of these species, can be interpreted to mean that if all of the occurrences of these species on the Forest were extirpated, the species would most likely survive and most likely not cause a trend to Federal listing.

Design criteria are described in Table 2 later in this document. Any deviation from these criteria will require further analysis and a revised effects determination. Some mitigation measures not included here are Forest Service standard operating procedures. Other mitigation measures not included here are additional Forest Plan Standards and Guidelines (including those relating to water, soils, riparian areas, travel and transportation, noxious weeds, and livestock grazing). Project implementation will incorporate all Forest Plan Standards and Guidelines.

With mitigation measures fully implemented, a determination of “May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range-wide” is made for the following species for the proposed action:

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leathery grapefern</td>
<td>Botrychium multifidum</td>
</tr>
<tr>
<td>Southwestern showy sedge</td>
<td>Carex bella</td>
</tr>
<tr>
<td>Downy gentian</td>
<td>Gentiana puberulenta</td>
</tr>
<tr>
<td>Broadlipped twayblade</td>
<td>Listera convallarioides</td>
</tr>
<tr>
<td>Stiff clubmoss</td>
<td>Lycopodium annotinum</td>
</tr>
<tr>
<td>Fivestamen miterwort</td>
<td>Mitella pentandra</td>
</tr>
<tr>
<td>Arrowleaf sweet coltsfoot</td>
<td>Petasites frigidus var. sagittatus</td>
</tr>
<tr>
<td>Northern hollyfern</td>
<td>Polystichum lonchitis</td>
</tr>
<tr>
<td>Greenleaf willow</td>
<td>Salix lasiandra var. caudata</td>
</tr>
<tr>
<td>Shining willow</td>
<td>Salix lucida</td>
</tr>
</tbody>
</table>

Table 2 summarizes determinations for all analyzed Black Hills plant species of local concern (SOLC) for both alternatives identified in the BHRL project.
Table 2: Determination Summary by Alternative for Analyzed Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Alternative A (proposed action)</th>
<th>Alternative B (no action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leathery grapefern</td>
<td>MAII³</td>
<td>NI¹</td>
</tr>
<tr>
<td>Southwestern showy sedge</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Downy gentian</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Broadlipped twayblade</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Stiff clubmoss</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Fivestamen miterwort</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Arrowleaf sweet coltsfoot</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Northern hollyfern</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Greenleaf willow</td>
<td>MAII</td>
<td>NI</td>
</tr>
<tr>
<td>Shining willow</td>
<td>MAII</td>
<td>NI</td>
</tr>
</tbody>
</table>

1 - No Impact  
2 - Beneficial Impact  
3 - May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.  
4 - Likely to result in a loss of viability in the Planning Area, or in a trend toward federal listing.

**Fens**

In Region 2, a fen is defined as an ancient wetland with continuous organic soil accumulation of 16 inches or more, with perennial support from ground water, and consistent saturation throughout the year (Austin 2005). They are classified as groundwater dependent ecosystems and are an important element of biological diversity due to their water-holding capability, unique characteristics and species assemblages, and support of several globally rare plant and invertebrate species. Fens occur where settings provide a highly specific balance between climatic conditions, bedrock lithology, constant ground water flow, and where natural barriers contribute to maintaining saturated conditions (Bedford & Godwin 2003). In the Black Hills, peat develops primarily from mosses (particularly *Sphagnum* spp.), the roots of sedges, and to a lesser extent from grasses.

The Forest Service Handbook 2509.25 directs managers to avoid any loss of rare wetlands such as fens and springs because these areas cannot be replaced in-kind. Many fens in Region 2 are known to be 6,000 to 10,000 years old, and often support sensitive plant species. Due to the slow rate of peat accumulation and specificity of ecological requirements, fens are difficult to reclaim and deemed essentially irreplaceable (USDA Forest Service 2011a). Black Hills National Forest is in the process of performing fen resource inventory as part of the national effort to catalogue Groundwater Dependent Ecosystems. Approximately 25 fens are believed to have been verified on the Black Hills National Forest, largely occurring on the Mystic Ranger District but also located on Northern Hills and Hell Canyon Ranger Districts (USDA Forest Service 2010). Other areas have been identified as potential fens and have yet to be surveyed to confirm or deny the classification.
Effects of Alternative A on Fens
Although several areas identified as fens and potential fens are located in close proximity to BHRL treatment areas, Design Criteria are in place to prevent direct impacts of timber management treatments and road construction on fens.

Indirect impacts to fens caused by timber harvest activities could include alterations to the groundwater hydrology, affecting the amount and quality of water available to fens. The rest of the indirect impacts would be caused by removal of vegetation upslope from fens, and the results would be similar to those to plant SOLC located downslope from treatments as discussed in the SOLC analysis.

Effects of Alternative B on Fens
Generally ponderosa pine does not occur within fens because the water table is too high for them to thrive; however they can grow along the margins of these wetlands (Jacobson et al. 1991). Design criteria associated with the proposed action would prevent most activities from occurring within the vicinity of fens, including pine and/or spruce removal from grasslands. Due to the restrictive management of fens, the effects of both alternatives on fens are similar, with the exception of vegetation removal upslope from fens which is considered in Alternative A.

Even in areas that have been surveyed for plants, it is recognized that target plants are not always observed when present. Some reasons are that plants may not be in prime growth stage for identification, they may be in dormancy, or they may be difficult to see in surrounding vegetation. More than half the plant species of concern in the Black Hills (Region 2 sensitive and Black Hills National Forest plant SOLC) are associated with wetland/riparian areas. Consequently, management protective of general riparian/wetland habitat and processes is an important component of protection for native plant species and communities.

Forest Plan Consistency

The Black Hills National Forest Plan as amended by the Phase II Amendment contains objectives, goals, standards, and guidelines relevant to the management of botanical resources on the National Forest. Following is a list of directives applicable to this project, with each standard and guideline followed by a short explanation of how the proposed project complies with the Phase II Amendment.

Objectives describe (1) desired resource conditions in the area covered by the Plan, either in the next decade or longer and (2) desired levels of goods and services that the Plan area is capable of producing in the next decade. The Forest Supervisor shall strive to plan and implement projects that contribute to achieving Forest Plan goals and objectives in a manner consistent with Forest Plan standards, guidelines, Forest Service policy, and applicable legal requirements. The objectives were developed in conjunction with the monitoring strategy described in Chapter Four of the Land and Resource Management Plan. A standard is defined as a limitation on management activities that is within the authority and ability of the agency to meet or enforce. Standards are used to determine if individual projects are in compliance with the Plan. Deviation from the requirement requires a Plan amendment. A guideline is a preferred or advisable course of action. Deviation from a guideline is permissible if the responsible official documents the
reasons for the deviation.

**Objective 221**: Conserve or enhance habitat for R2 Sensitive species and species of local concern (SOLC). Monitoring will be conducted at a forest-wide level, not at the project level, and will be done for habitats or populations.

*Design criteria along with proposed mitigations would conserve potential habitat for R2 sensitive plant species and Black Hills SOLC. In addition, removal of ponderosa pine encroaching on these habitats would serve to enhance this habitat for these plant species.*

**Objective 234**: Create or maintain a moderate to low-crown-fire hazard adjacent to occurrences of R2 sensitive and species of local concern plants and botanical areas bordered by continuous, dense conifer stands where long-term persistence is at risk from a single high-intensity fire.

*Fuel treatments and thinning near occurrences of R2 sensitive plant species and plant SOLC will decrease the risk of catastrophic fire which could threaten suitable habitat.*

**Standard 3106**: Riparian areas or wetlands where populations of Sensitive species are located are to be avoided during ground disturbing activities. Use one or more of the following (or other mitigation measure) tied to the site-specific conditions for disturbances adjacent to known occurrences:

a. Avoid removing riparian or wetland vegetation; filling or dredging the riparian area or wetland; diverting stream flow from the current channel.
b. Prevent storm runoff from washing silt into the stream or wetland.
c. Reseeder and/or replant cut and fill slopes with native seed and/or native plants promptly to control erosion and for prevention of noxious-weed infestations. Use appropriate measures to control erosion on disturbed areas that are steep, are highly erosive, and/or adjacent to the riparian area.
d. Timing, placement, and installation of temporary stream diversions shall allow passage of aquatic life and protect Sensitive and species of local concern.

*With design criteria in place, any ground disturbing activities proposed in riparian areas or wetlands where sensitive species are located would be addressed prior to implementation.*

**Standard 3115**: An R2 Sensitive species or species of local concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator, and biologist and/or botanist. Solutions need to be based on the circumstances of each new discovery and must consider the species need, contractual obligations and costs, and mitigation measures available at the time of discovery. *This standard is incorporated into the botany design criteria and timber sale contracts.*

**Guideline 4102a**: Avoid the use of earth-moving equipment within national register eligible heritage resource sites, known locations of R2 sensitive species and species of local concern plants, BAs, RNAs, or in stream channels, except at designated points and with proper
mitigation. Prohibit this use in the Wilderness.

*With design criteria in place, any earth-moving equipment within known locations of R2 sensitive plant species or plant species of local concern would be addressed prior to implementation.*

**Design Criteria for Botanical Resources**

**Table 2: Design Criteria for Botanical Resources**

<table>
<thead>
<tr>
<th>All Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All activity areas would be reviewed to determine presence and location of botanical resources prior to contract or permit issuance.</td>
<td></td>
</tr>
<tr>
<td>Any Region 2 sensitive plant species or plant species of local concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator, and botanist. (Standard 3115)</td>
<td></td>
</tr>
<tr>
<td>Riparian areas or wetlands where populations of Region 2 sensitive plants are located would be avoided during surface disturbing activities (Standard 3106).</td>
<td></td>
</tr>
<tr>
<td>Surface disturbing activities, such as skid trails, landings, road construction, etc., would be avoided in meadows, wetlands, and riparian areas (suitable rare plant habitat, Standard 1306). If, during implementation, activities such as these cannot be located outside of meadows, a qualified (0430 series) botanist would be contacted prior to implementation to determine if special requirements are warranted to protect site integrity.</td>
<td></td>
</tr>
<tr>
<td>For areas outside of designated treatment areas, surface disturbing activities including, but not limited to skid trail designation, landing creation, pile construction, road construction or reconstruction/conversion, would be evaluated for risk to rare plants and their habitat by a qualified (0430 series) botanist prior to implementation.</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation of pile sites would include site preparation and seeding to return the sites to productivity and control the spread of noxious weeds.</td>
<td></td>
</tr>
<tr>
<td>No wheeled or tracked equipment would be allowed within 100 feet of fens.</td>
<td></td>
</tr>
<tr>
<td>Temporary roads, skid trails, landings, or piles would not be located within 100 feet of fens.</td>
<td></td>
</tr>
<tr>
<td>Treatment within fens would be limited to hand felling of trees and would require assessment by a qualified (0430 series) botanist prior to implementation. All woody material (chips, piles, cut and chunk, logs, etc.) would be removed from the fen area with as little impact to the fen as possible (i.e. hand carrying out via a single trail/disturbance).</td>
<td></td>
</tr>
<tr>
<td>Treatments within or adjacent to Black Hills Montane Grasslands will require assessment by qualified (0430 series) botanist prior to implementation.</td>
<td></td>
</tr>
<tr>
<td>When logging in previously disturbed stands, existing skid trails and landings would be used whenever possible.</td>
<td></td>
</tr>
<tr>
<td>Treatment would not occur within Research Natural Areas.</td>
<td></td>
</tr>
<tr>
<td>Treatment would not occur within Botanical Areas.</td>
<td></td>
</tr>
<tr>
<td><strong>Road Construction / Maintenance</strong></td>
<td></td>
</tr>
<tr>
<td>New road construction would require consultation with a qualified (0430 series) botanist prior to implementation.</td>
<td></td>
</tr>
<tr>
<td>No road construction or reconstruction/conversion would be allowed if proposed site is located over 40% slope and up- or downslope of a known rare plant population in order to avoid the effects of mass movement.</td>
<td></td>
</tr>
<tr>
<td>Neither magnesium chloride nor calcium chloride would be used for dust abatement.</td>
<td></td>
</tr>
</tbody>
</table>
within 500 feet of fens or known rare plant sites.

New road construction would not occur within 100 feet of fens.

Herbicide Spraying
Areas of exposed soil associated with Mechanical Site Preparation would be monitored and treated as needed to prevent spread of noxious weeds.

Spraying treatments would not occur within 200 feet of fens.

Hardwood / Grassland Enhancement
Proposed treatment areas would be reviewed for rare plants and/or suitable habitat prior to contract or permit issuance.

Pine Structural Stage Modification
Mechanical site preparation would not occur within 100 feet of fens or known rare plant sites.

Cable logging in areas known to contain rare plants would only occur when there is a foot of snow on the ground to avoid soil disturbance and impacts to rare plants.

### Fen Design Criteria (Table 3)

<table>
<thead>
<tr>
<th>All Activities</th>
<th>Timber Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100-foot WIZ for intermittent &amp; perennial streams, springs, and wetlands</td>
</tr>
<tr>
<td></td>
<td>No mechanized equipment zone for 50-feet around intermittent &amp; perennial streams, springs, and wetlands</td>
</tr>
<tr>
<td></td>
<td>Designate skid trails with sale administration within 50 to 100 feet near streams, springs, and wetlands</td>
</tr>
<tr>
<td></td>
<td>Line pulling could occur within 0 to 50 feet of the stream</td>
</tr>
<tr>
<td></td>
<td>No landings within 100 feet of streams, springs, and wetlands</td>
</tr>
<tr>
<td></td>
<td>Water bars or slash, or a combination of both, will be placed across skid trails depending on which erosion control method is most appropriate to an individual site immediately following harvest activities to reduce erosion potential</td>
</tr>
<tr>
<td></td>
<td>When logging in previously disturbed stands, use existing skid trails and landings whenever possible</td>
</tr>
<tr>
<td></td>
<td>Avoid locating temporary roads within 100 feet of perennial or intermittent streams, springs, or wetlands</td>
</tr>
<tr>
<td></td>
<td>Temporary road crossings on perennial and intermittent streams will require a structure to span the stream; such as temporary bridge, temporary arch, cattle guard, skidder bridge, or similar structure to avoid damage to stream and stream bank, and to maintain streambank stability</td>
</tr>
</tbody>
</table>

| Transportation System                               | Consult hydrologist on all temporary road crossings on perennial and intermittent streams |
|                                                     | Avoid building temporary roads within wetlands and adjacent to WIZ buffers |
|                                                     | Provide adequate road and trail cross drainage to reduce erosion (Guideline 9209e) by installing water bars/rolling dips within the WIZ |
- Minimize fill in floodplains to facilitate crossings to allow flood flows to pass with minimal interruption
- Avoid system road building within wetlands and adjacent WIZ buffers

DEFINITIONS

High Probability Habitat: For most sensitive plant species includes, but not limited to: sites with additional moisture and/or shade such as: shady lower slopes and bottoms adjacent to and including riparian areas; creeks and drainages (especially north trending); springs, boggy areas and seeps; northwest to northeast facing slopes; sites dominated by moisture-loving hardwoods (such as birch, ironwood, or hazelnut) or dominated by spruce, rock outcrops, and native grass meadows.

Low Probability Plant Habitat: Habitats lacking characteristics desirable for the occurrence of sensitive plant species. Low probability plant habitat is fairly constant throughout the Black Hills National Forest and consists of drier sites such as dry pine sites, and dry meadows with non-native plant species.

Region 2 Sensitive Species: Plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:
  a. Significant current or predicted downward trends in population numbers or density.
  b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (Forest Service Manual 2670.5, 19).

Suitable Habitat: Habitat which meets the requirements of a species or group of species. Different species may have different requirements and not all requirements may be understood at this time. Examples of different possible requirements include: vegetative composition, edaphic characteristics, moisture content, landscape structure, and the presence of mycorrhizal associations. Habitat may be suitable but unoccupied and it may exhibit varying degrees of quality. There is likely a spectrum of suitability that varies in time.

Survey Types:

Field Check: The surveyor gives the area a quick “once over” but does not walk completely through the project area. The entire project area has not been examined. Approximately 2-10% of the project area has been examined.

Cursory: The surveyor gives the area a quick “once over” by walking through the project area. Approximately 11-24% of the project area has been examined.

General: The surveyor gives the area a closer look by walking through the project area and perimeter or by walking more than once through the area. Approximately 25-49% of the project area has been examined.

Intuitive Controlled: The surveyor has given the area a closer look by conducting a complete
reconnaissance through a specific area of the project after walking through the project area and perimeter or by walking more than once through the area. Approximately 50-74% of the project area has been examined.

**Complete:** The surveyor has walked through the area being examined until all of the area has been examined. Approximately 100% of the project area has been examined.

**Target Plant Species:** This term is used to collectively describe R2 sensitive plant species, South Dakota state-listed plant species of concern, species of local concern, and species of insufficient information.

**Species of Insufficient Information:** Those species evaluated in the process for identifying wildlife and plant species of local concern, but having insufficient information available to make a determination. This list appears in the Black Hills National Forest Land and Resource Management Plan Phase II Amendment Final EIS.

**Species of Local Concern (SOLC):** Plant, fish or wildlife species (including subspecies or varieties) that do not meet the criteria for sensitive status. These could include species with declining trends in only a portion of Region 2, or those that are important components of diversity in a local area. The local area is defined as NFS lands within the Black Hills National Forest (USDA Forest Service 2005a). The list of SOLC appears in the Black Hills National Forest Land and Resource Management Plan Phase II Amendment Final EIS.

**LITERATURE CITED**


