| | |
|---|---|
| **SPECIES: Scientific [common]** | ***Luzula glabrata var. hitchcockii* [Hitchcock's smooth woodrush]**<br>Other scientific names: ***Luzula hitchcockii*** |
| **Forest:** | Bridger-Teton National Forest |
| **Forest Reviewer:** | **R.Lehman** |
| **Date of Review:** | **5/7/20; 4/3/21** |
| **Forest concurrence (or recommendation if new) for inclusion of species on list of potential SCC: (Enter Yes or No)** | **No** |

**FOREST REVIEW RESULTS:**

1. The Forest concurs or recommends the species for inclusion on the list of potential SCC:
   Yes___ No_X__

2. Rationale for not concurring is based on (check all that apply):
   Species is not native to the plan area _____
   Species is not known to occur in the plan area _____
   Species persistence in the plan area is not of substantial concern __X_____

**FOREST REVIEW INFORMATION:**

1. Is the Species Native to the Plan Area? Yes_X__ No___

   If no, provide explanation and stop assessment.

2. Is the Species Known to Occur within the Planning Area? Yes_X__ No____

   If no, stop assessment.

**Table 1.** All Known Occurrences, Years, and Frequency within the Planning Area

| Year Observed | Number of Individuals | Location of Observations (USFS District, Town, River, Road Intersection, HUC etc.) | Habitat Description | Source of Information[1] |
|---|---|---|---|---|
| 9/4/2002 | Unknown | U.S.A., Wyoming, Teton County: Grand Teton National Park: ridge ca 0.3 air mi E of Forellen Peak, ca 19 air mi NW of Moran. | Forested northwest slope with Pinus albicaulis, Abies lasiocarpa, Picea engelmannii, with dwarf shrub cover. Phenology: fruiting. Elev. 9680 ft. | Erika Lee, s.n. with Corry Bolen. No id number (Rocky Mountain Herbarium 2020). |
| 9/1/1995 | 25-50 plants. | U.S.A., Wyoming, Teton County: Snake River Range: | Coniferous forest dominated by *Abies* | Stuart Markow 11190a, EO #4 |

| | | | | |
|---|---|---|---|---|
| | Numerous in scattered patches on both sides of trail. | boundary between Targhee National Forest and Bridger-Teton National Forest, along trail leading from Teton Pass to Pass Peak (point 9279), ca 0.5-1 mile south of Teton Pass. 43.4898° N, 110.9542° W; uncertainty 1 mi. | *lasiocarpa* and *Picea engelmannii.* Occurs with *Arnica cordifolia, Osmorhiza depauperata, Thalictrum* sp. Elev. 9000 ft. | (Rocky Mountain Herbarium 2020, WYNDD 2019). |
| 7/27/1999 | Unknown | U.S.A., Wyoming, Teton County: Snake River Range: Bridger-Teton National Forest: ca 1 mi S of Teton Pass, ca 5 mi W of Wilson. Along trail leading from Teton Pass to Pass Peak (point 9279), ca 0.5-1 mile south of Teton Pass. 43.49° N, 110.9549° W; uncertainty 1 mi. | Spruce-fir forest with *Carex rossii, Pedicularis racemosa, and Luzula glabrata* var. *hitchcockii.* Phenology: fruiting. Elev. 8700 ft. | Erwin Evert 37347, EO #4 (Rocky Mountain Herbarium 2020, WYNDD 2019). |

[1]The Consortium of Pacific Northwest Herbaria, WYNDD GIS data, and SEINet were also searched, and no additional occurrences were found (Consortium of Pacific Northwest Herbaria 2020; WYNDD 2019; SEINet 2020).

a. Are all Species Occurrences Only Accidental or Transient?

Yes___ No_X__

If yes, document source for determination and stop assessment.

b. For species with known occurrences on the Forest since 1990, based on the number of observations and/or year of last observation, can the species be presumed to be established or becoming established in the plan area?

Yes_X__ No__

If no, provide explanation and stop assessment

c. For species with known occurrences on the Forest predating 1990, does the weight of evidence suggest the species still occurs in the plan area?

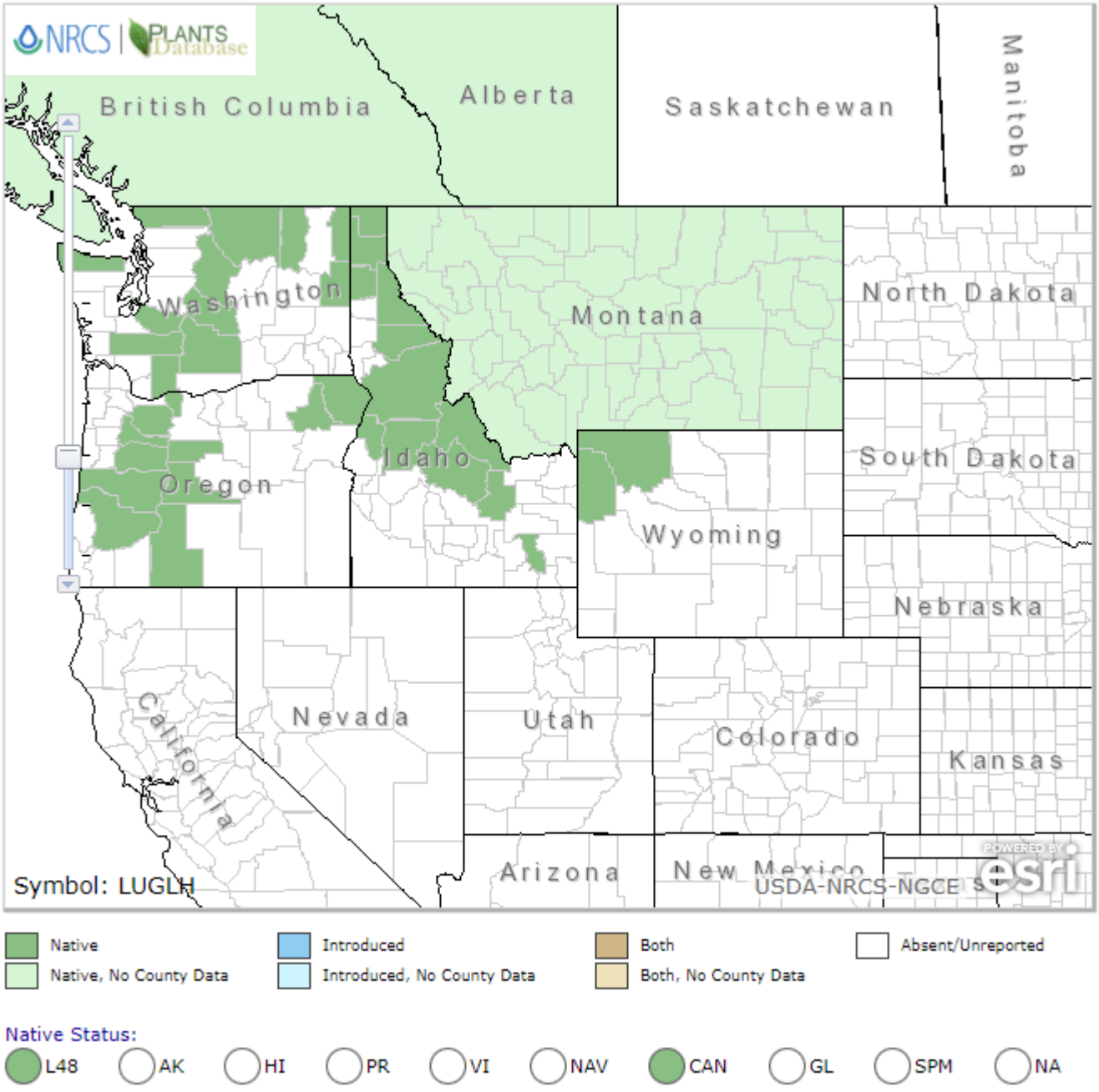
Yes___ No___

Provide explanation for determination

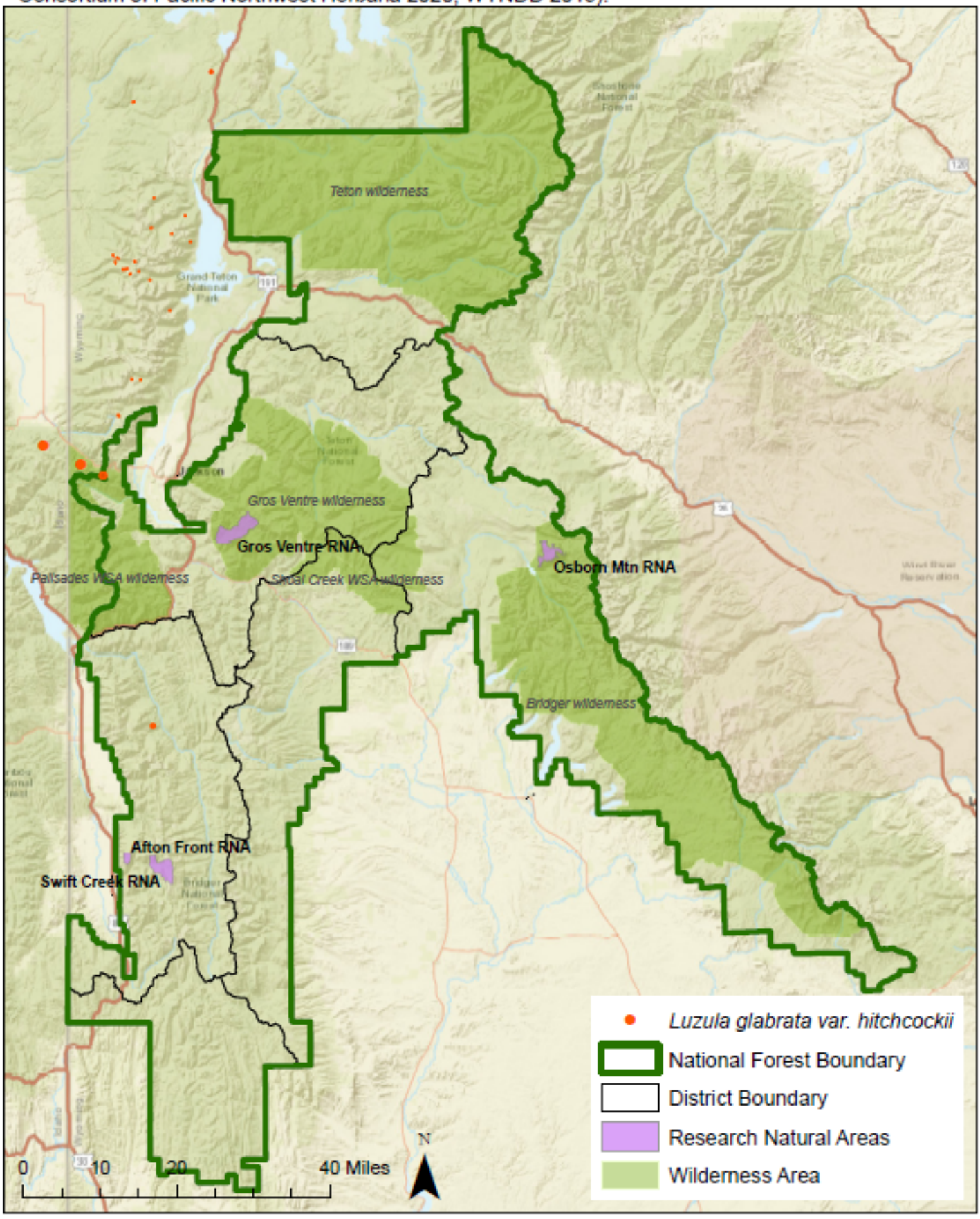
N/A–Occurrences have been documented since 1990.

If determination is no, stop assessment

**Map 1**, *Luzula glabrata var. hitchcockii* range in Wyoming and surrounding states (NRCS 2020).



**Map 2**, *L. glabrata var. hitchcockii* occurrences in Bridger-Teton National Forest vicinity (SEINet 2020; Consortium of Pacific Northwest Herbaria 2020, WYNDD 2019).



3. Is There Substantial Concern for the Species' Capability to persist Over the Long-term in the Plan Area Based on Best Available Scientific Information?

**Table 2.** Status summary based on existing conservation assessments

| Entity | Status/Rank (include definition) |
|---|---|
| **NatureServe Global Status** | **G5—Secure**<br><br>*Secure — At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.* |
| **NatureServe State Status** | **S2—Imperiled**<br><br>*At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.* |
| **WYNDD** | **Plant Species of Concern**<br><br>*Species vulnerable to extirpation at the global or state level due to:*<br>*a. their rarity (e.g., restricted distribution, small population size, low population density)*<br>*b. inherent vulnerability (e.g., specialized habitat requirements, restrictive life history)*<br>*c. threats (e.g., significant loss of habitat, sensitivity to disturbances)*<br>(Wyoming Natural Diversity Database - Species of Concern) |
| **USDA Forest Service** | Not Region 4 Sensitive |
| **USDOI FWS** | Not listed |
| **USDOI BLM** | Not listed |
| **IUCN** | Not listed |

Sources: WYNDD 2020; Heidel 2018; USDA Forest Service Regions 2 and 4 Sensitive Species Lists; NatureServe 2020

**Table 3.** Status summary based on best available scientific information.

| Criteria | Rationale |
|---|---|
| Distribution on the Bridger-Teton National Forest | Occurrence details and locations are presented in Table 1 and Map 2. There are two areas with documented occurrences; one on the western boarder in the Palisades WSA and that other is in the Snake River Range. |
| Distribution outside the Bridger-Teton National Forest | Occurs from southern British Columbia and southwestern Alberta to Oregon, northern Idaho, and northwestern Wyoming. In Wyoming, known from the Beartooth, Snake River and Teton Ranges, Jackson Hole and Yellowstone Plateau (Park and Teton counties). The majority of known occurrences in Wyoming are outside Bridger-Teton National Forest to the west. |
| Abundance on the Bridger-Teton National Forest | Not known. |
| Population Trend on the Bridger-Teton National Forest | Not known. |
| Habitat Trend on the Bridger-Teton National Forest | This species inhabits montane forest to subalpine and alpine slopes, ridges, and meadows. Wyoming populations are in openings in *Abies concolor, Picea engelmannii* and *Pinus flexilis* forests, spruce swamps and mixed, coniferous forests (Fertig 2000, WYNDD 2020).<br><br>To analyze trends in occupied habitat, aerial imagery and a USFS GIS database of invasive plant populations, historical wildfires, trails, roads, Wilderness Areas, and Research Natural Areas was assessed at each contemporary occurrence on the Forest (USFS GIS 2019, Google Earth Pro 2020).<br><br>• Element Occurrence #4: In the Palisades Wilderness Study Area near the western boarder of the national forest. This element occurrence is along Black Canyon trail and may be subject to recreational impacts.<br>• Lee 9/24/2002 occurrence: Located outside Wilderness area. In forage reserve grazing allotment White Creek-Man Peak. Invasive thistle polygons mapped within 0.5 mile to southeast along Forest Road 10003.<br><br>Based on the above analysis *Luzula hitchcockii* may be subject to recreational impacts due to close proximity to trails. The southern occurrence may be affected by livestock grazing. |
| Threats to the Species and its Habitat on the Bridger-Teton National Forest | Specific threats to this species is unknown. However, climate change is likely a significant threat to forest ecosystems of the Intermountain West. Projections for the Intermountain Adaptation Partnership region estimate that average annual minimum and maximum temperatures are likely to increase by 5 to 12 deg F, |

| Criteria | Rationale |
|---|---|
| | mean annual precipitation will remain the same or increase slightly, extreme events (e.g., drought and extreme precipitation events) will occur more frequently and be more severe, and greenhouse gas concentrations will continue to increase through the end of the 21st century. Increased minimum daily temperatures have resulted in longer frost-free periods. Projections vary by subregion, but even where precipitation is projected to increase slightly, higher temperatures are likely to increase effective drought and soil water deficit (Halofsky et al. 2018).<br><br>Alpine communities are possibly the ecosystems in the region that are most at risk from the effects of climate change because of their shrinking habitat. According to Intermountain Adaptation Partnership assessments, alpine communities have a high sensitivity to climate change, a low adaptive capacity, and very high vulnerability to climate change (Halofsky, et al. 2018). Climate change is expected to cause increasingly warmer and wetter conditions, with worsening summer drought, and alpine areas may transition from snow-dominated to rain-dominated. An extended growing season is projected to occur in the alpine which can result in interspecific competition for resources, changes in plant community composition and displacement of rare plant populations where they currently occupy specific niches (Halofsky et al. 2018).<br><br>Alpine systems are dependent on snowfields and gradual snowmelt to maintain moisture for vegetation. Warming temperatures, increased drought, and changes in the depth and persistence of snowpack, surface water flow, and timing of peak runoff are projected to greatly affect alpine habitat in the Intermountain Region (Halofsky et al. 2018). The composition and distribution of alpine ecosystems will be affected by decreasing snowpack. For high-elevation vegetation, climate change may affect seed germination and survival by modifying moisture availability and therefore result in reduced plant success. Specific effects will depend on vulnerability thresholds of the characteristic species and the rate and magnitude of changes over time. Reduced snowpack with warming is likely to cause major changes in alpine plant communities (Halofsky, et al. 2018).<br><br>Some loss of alpine vegetation communities, especially mesic meadows, attributed to upslope migration of trees and shrubs may occur (Halofsky et al. 2018). Some, subalpine communities may have potential to migrate higher in elevation as a response to changing conditions, but this may be limited by underdeveloped soils at higher altitudes. Furthermore, the rate of climatic change in alpine communities may outpace the ability of species to shift their distribution (Ash et al. 2016; Dirnbock et al. 2011). Other communities may already exist at the highest elevations in the BTNF and, therefore, may have limited upward migration potential.<br><br>Rare plant populations that may be small, isolated, tied to snowpack abundance and distribution timing |

| Criteria | Rationale |
|---|---|
| | changes of spring thaw and fall frost cycles, and/or have limited dispersal capacity, are highly vulnerable to impacts from environmental change including reductions in pollination (Ellstrand and Diane 1993, Halofsky et al. 2018). Changes in temperature and precipitation may lead to greater variability in forb flowering, which could create an asynchronistic effect with native pollinator emergence (Halofsky et al. 2018; Miller-Struttmann et al. 2015), leading to decreased reproduction in native plants. The value of pollinators in natural systems is difficult to quantify, but as pollinators are critical for successful reproduction and seed set for approximately 85% of flowering species globally (Hatfield et al. 2012), this asynchronistic effect may have profound implications.<br><br>Many of the sites that include Hitchcock's smooth woodrush are outside commercial timber production areas, and timber management activities are not anticipated. Therefore, management of Hitchcock's smooth woodrush is generally not part of a timber management plan. Those sites occupied largely by subalpine fir and mountain hemlock (SEE HABITAT TYPES) are generally managed using partial thinnings, long rotations (60 to 80 years), and at times are artificially regenerated (Habeck 1992).<br><br>Fire can top kill this species but following fire, Hitchcock's smooth woodrush sprouts from surviving rhizomes and shows an increase in biomass following fire. In western Montana, mean fire intervals for Hitchcock's smooth woodrush sites range from 30 to 41 years (Habeck 1992) |
| Life history and demographic characteristics of the species | *Luzula hitchcockii* is a perennial graminoid with single or loosely clustered stems (culms) 15-50 cm tall from a short rhizome. Leaves are 2-6 cm long and have flat blades. Basal leaves are linear-lanceolate and glabrous, while stem leaves are more broadly lance-shaped and have long, soft hairs at the base of the blade. The inflorescence is an open panicle 3-8 cm long with thin, nodding to erect flower branches. Flowers consist of 6 sharp-tipped, purplish-brown to chestnut perianth segments 2.5-3.5 mm long. Each flower is subtended by a pair of irregularly-toothed bracts. Anthers are 0.8-1.2 mm long and are much longer than their filaments. Fruits are ovate capsules with a beak-like style ca 1 mm long (WYNDD 2020). Hitchcock's smooth woodrush has been widely cited as being rhizomatous, and usually regenerates into extensive colonies. It also reproduces via seed. eeds of Hitchcock's smooth woodrush are primarily dispersed by the splash cup method. Heavy raindrops falling directly, or from a tree drip edge, throw seeds out from the flared lip of the open capsule. In higher elevations where heavy snowpacks restrict Hitchcock's smooth woodrush height, seed dispersal relies upon vibrations from wind or passing animals (Habeck 1992). Herbarium specimens of Hitchcock's smooth woodrush collected in western Montana show a flowering period that ranges from June 28 to August 13 for plants at 6,000 to 7,100 feet. At high elevations (8,000 to 8,700 feet), flowering occurs from July 15th to September 1. |

| Criteria | Rationale |
|---|---|
| | Hitchcock's smooth woodrush is found in high elevations, generally ranging from 5,700 to 8,200 feet (1,737-2,500 m), with deep, late-melting snowpacks and is considered an indicator of cold environments. It occupies a variety of sites from montane forests to subalpine and alpine slopes, ridges, meadows, and cirque floors. Once Hitchcock's smooth woodrush becomes established, it often forms a heavy mat which excludes other understory plants from establishing. Hitchcock's smooth woodrush is found on soils derived from granitics to noncalcareous parent materials. Surface soils tend to be very acidic (pH 4.2 to 4.8). Soil textures range from sandy loam to gravelly loam (Habeck 1992).<br><br>Hitchcock's smooth woodrush sites are generally important to wildlife species inhabiting high elevations. Thirteen plant species were identified as being important grizzly bear food on a Hitchcock's smooth woodrush habitat site in northern Idaho and Montana. Elk in central Idaho find Hitchcock's smooth woodrush sites to have medium forage value in both summer and fall. Caribou use Hitchcock's smooth woodrush sites in northern Idaho for calving habitat during June to mid-July (Habeck 1992).<br><br>Hitchcock's smooth woodrush generally occurs with subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*). It also occupies 20 to 25 percent ground cover of subalpine larch (*Larix lyallii*) communities in the Pacific Northwest. Associated tree species include Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), western white pine (*Pinus monticola*), lodgepole pine (*P. contorta*), whitebark pine (*P. albicaulis*), and Engelmann spruce (*Picea engelmannii*). Understory associates include grouse whortleberry (*Vaccinum scoparium*), Sitka valerian (*Valeriana sitchensis*), mountain arnica (*Arnica latifolia*), and menziesia (*Menziesia ferruginea*) (Habeck 1992). |
| Date: May 6, 2020<br>Reviewer: j. Remp | |

**Summary and Recommendations**

Species (Scientific and Common Name): ***Luzula glabrata var. hitchcockii*** **[Hitchcock's smooth woodrush]**
Other scientific names: ***Luzula hitchcockii***

*L.glabrata var. hitchcockii* is listed as S2 (critically imperiled) and G5 (secure) globally. It is a Species of Conservation Concern in Wyoming. Occurs from southern British Columbia and southwestern Alberta to Oregon, northern Idaho, and northwestern Wyoming. In Wyoming, known from the Beartooth, Snake River and Teton Ranges, Jackson Hole and Yellowstone Plateau (Park and Teton counties). Most known occurrences in Wyoming are outside Bridger-Teton National Forest to the west. There are two areas with documented occurrences on the BTNF; one on the western boarder in the Palisades WSA and that other is in the Snake River Range.

Although the forest has experienced significant botanical exploration, it is likely that targeted surveys would reveal additional (though few) populations. No return visits have taken (or documented) place and so an assessment of trend must address the potential risks to existing habitat.

This species inhabits montane forest to subalpine and alpine slopes, ridges, and meadows. Wyoming populations are in openings in *Abies concolor, Picea engelmannii* and *Pinus flexilis* forests, spruce swamps and mixed, coniferous forests (Fertig 2000, WYNDD 2020). Suitable habitat for the species is common in the plan area. This analysis indicates the two known occurrences maybe be impacted by grazing, non-native invasive plants, changes in climate, and recreational impacts.

Given the potential exposure of the two occurrences of *Luzula glabrata var. hitchcockii* to multiple threats there are concerns for the populations, but based on the large extent of suitable habitat within the planning area with few overall threats there isn't a substantial concern for the species continued existence within the plan area. Based on this analysis it is not recommended that the taxon be included as a SCC. Site species surveys are highly recommend for this species to validate this analysis and to establish better information about the species within the planning area.

Evaluator: Jessica Irwin, Rose Lehman Date: 4/3/2021

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