

SPECIES: Scientific [common]	<i>Braya glabella</i> [smooth northern-rockcress]
Forest:	Bridger-Teton National Forest
Forest Reviewer:	R.Lehman
Date of Review:	5/6/20; 1/13/21
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 _____

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	Source of Information¹
1994	Unknown	WY, Teton County, Gros Ventre Area: southeast ridge and summit of Darwin Peak.	Rocky alpine slopes. Elevation: 11000-11647 ft.	Ronald Hartman, 49496 (Rocky Mountain Herbarium 2020; SEINet 2020)
1998	Uncommon. Fewer than 5 plants observed in less than 20 square feet.	WY, Sublette County, Gros Ventre Range: saddle at north end of Doubletop Mountain and lower slopes on north side of Doubletop Peak, ca 1.5 mi S of Brewster Lake.	Cushion plant community on gravelly dolomite rim of saddle above steep wall of limestone; vegetative cover up to 50%, rock cover ca 40%; dominants include <i>Phlox pulvinata</i> , <i>Astragalus kentrophyta</i> , <i>Castilleja pulchella</i> ,	Walter Fertig, 18520, EO #1 (Rocky Mountain Herbarium 2020; SEINet 2020; WYNDD 2019)

			<i>Smelowskia</i> , <i>Carex nardina</i> , and <i>Dryas</i> . Elevation: 11000-11600 ft.	
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The Consortium of Pacific Northwest Herbaria was also searched, and no additional occurrences were found (Consortium of Pacific Northwest Herbaria 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

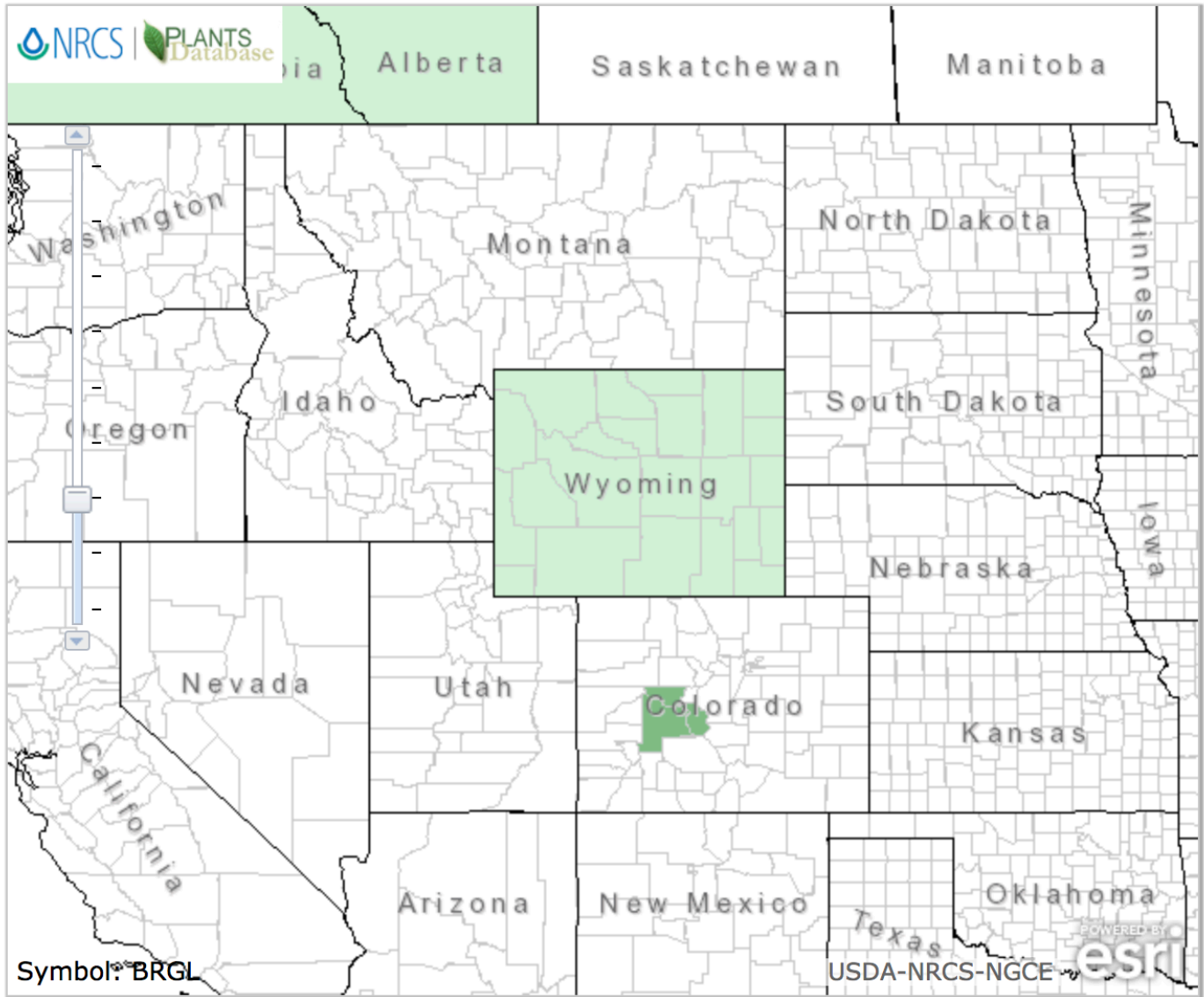
- c. For species with known occurrences on the Forest predating 1990, does the weight of evidence suggest the species still occurs in the plan area?

Yes ___ No ___

N/A—occurrences have been documented since 1990.

If determination is no, stop assessment

Map 1, *Braya glabella* range in Wyoming and surrounding states (NRCS 2020).

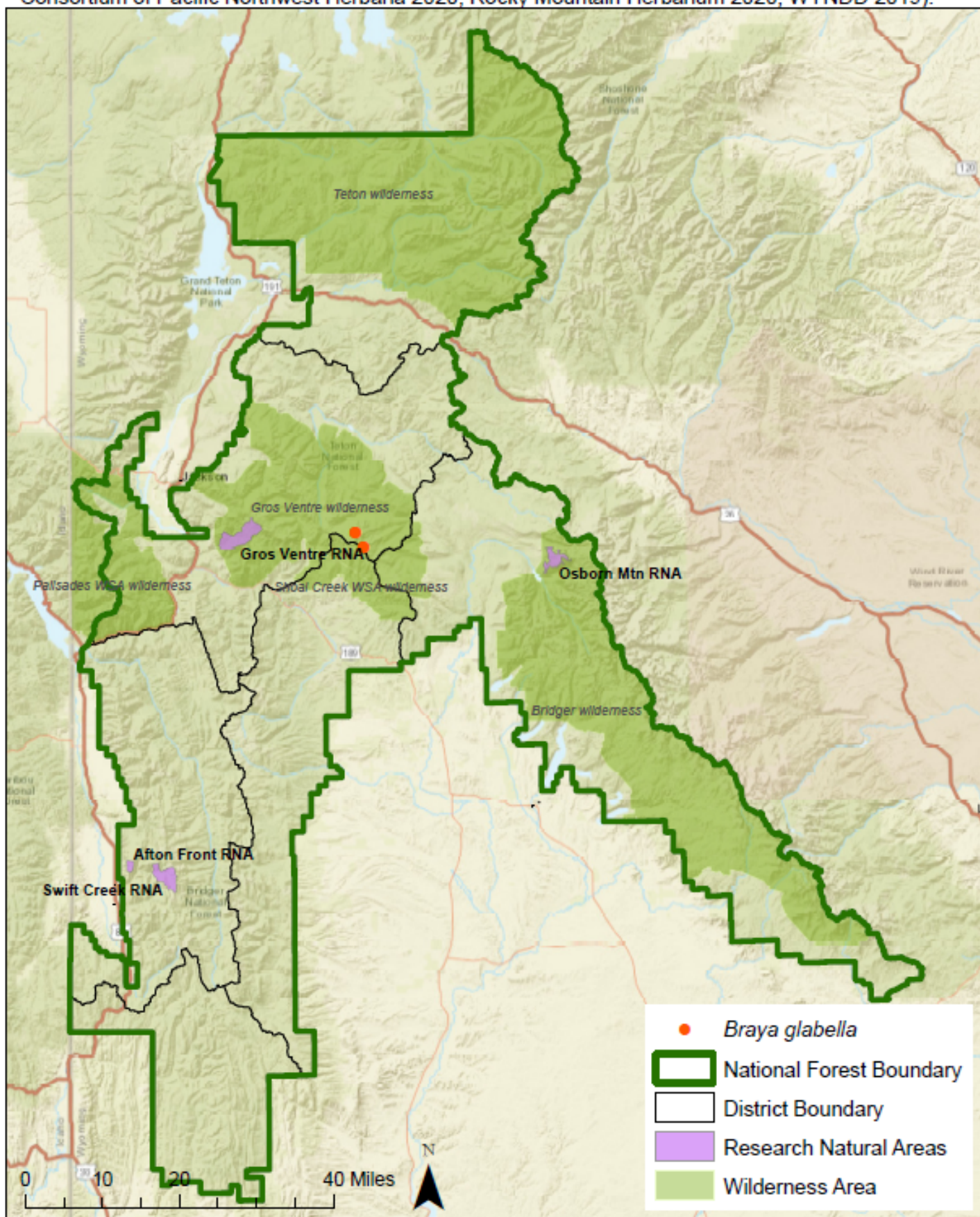


- | | | | |
|---|---|---|--|
| <input checked="" type="checkbox"/> Native | <input type="checkbox"/> Introduced | <input type="checkbox"/> Both | <input type="checkbox"/> Absent/Unreported |
| <input type="checkbox"/> Native, No County Data | <input type="checkbox"/> Introduced, No County Data | <input type="checkbox"/> Both, No County Data | |

Native Status:

- | | | | | | | | | | |
|---|--|-----------------------------|-----------------------------|-----------------------------|------------------------------|---|--|------------------------------|-----------------------------|
| <input checked="" type="checkbox"/> L48 | <input checked="" type="checkbox"/> AK | <input type="checkbox"/> HI | <input type="checkbox"/> PR | <input type="checkbox"/> VI | <input type="checkbox"/> NAV | <input checked="" type="checkbox"/> CAN | <input checked="" type="checkbox"/> GL | <input type="checkbox"/> SPM | <input type="checkbox"/> NA |
|---|--|-----------------------------|-----------------------------|-----------------------------|------------------------------|---|--|------------------------------|-----------------------------|

Map 2. *B. glabella* occurrences in Bridger-Teton National Forest vicinity (SEINet 2020; Consortium of Pacific Northwest Herbaria 2020; Rocky Mountain Herbarium 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—Apparently Secure <i>At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.</i>
NatureServe State Status	S1— Critically Imperiled <i>At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.</i>
WYNDD	Plant Species of Concern G5/S1 <i>Species vulnerable to extirpation at the global or state level due to:</i> <i>a. their rarity (e.g., restricted distribution, small population size, low population density)</i> <i>b. inherent vulnerability (e.g., specialized habitat requirements, restrictive life history)</i> <i>c. threats (e.g., significant loss of habitat, sensitivity to disturbances)</i> (Wyoming Natural Diversity Database - Species of Concern)
USDA Forest Service	Not listed
USDOI FWS	Not listed
USDOI BLM	Not listed
IUCN	Not listed

Heidel 2018, NatureServe 2020, WYNDD 2020a

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

Criteria	Rationale
Distribution on the Bridger-Teton National Forest	<i>Braya glabella</i> is known from 2 occurrences on the Bridger-Teton National Forest, both of which were discovered since 1990. Both occurrences are in the Gros Ventre Wilderness Area, on rocky alpine habitat (Table 1, Map 2). This suggests the species' distribution on the Bridger-Teton National Forest is sparse and isolated.

Criteria	Rationale
Distribution outside the Bridger-Teton National Forest	<i>Braya glabella</i> occurs from Alaska to Greenland, south to British Columbia and Alberta. Disjunct populations occur in northwestern Wyoming and central Colorado; also in Quebec and Labrador. In Wyoming, it is known only from two occurrences in the Gros Ventre Range (Sublette and Teton counties) (WYNDD 2020b).
Abundance on the Bridger-Teton National Forest	Populations in Wyoming are small and highly localized (WYNDD 2020b). Overall abundance in Wyoming, and thus on the Bridger-Teton National Forest where the only populations are known, is thought to be rare (Heidel 2018).
Population Trend on the Bridger-Teton National Forest	Overall, this species is secure within its primary range (NatureServe 2020), but population trends in Wyoming are unknown (WYNDD 2020b; Heidel 2018). Trends on the Bridger-Teton National Forest cannot be assessed due to lack of data.
Habitat Trend on the Bridger-Teton National Forest	<p><i>Braya glabella</i> inhabits barren, usually calcareous soils and gravel, from sea shores to alpine scree slopes and solifluction lobes. Wyoming populations are in tundra on alpine cliff rims and fellfields of calcareous rocky soils with <i>Dryas octopetala</i> and <i>Carex rupestris</i> (WYNDD 2020b).</p> <p>To analyze trends in habitat, aerial imagery and a USFS GIS database of existing grazing allotments, invasive plant populations, historical wildfires, trails, roads, Wilderness Areas, and Research Natural Areas (RNAs) was assessed at each occurrence (USFS GIS 2019, Google Earth Pro 2019).</p> <p>Both occurrences are on remote, alpine terrain within the Gros Ventre Wilderness Area. A Wilderness Area is “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions” (Wilderness Act of 1964), indicating that effects from anthropogenic activities are likely minimal. Additionally, no roads exist near these occurrences, which further confirms the low potential for human effects. Proximity (within approximately 1–2 miles) of both occurrences to non-motorized hiking trails may slightly increase potential for human presence and trampling impacts, but because the occurrences are in remote, rugged locations, they likely seldom see human visitors.</p> <p>Additionally, neither occurrence is accessible to livestock, within large fire perimeters, nor in close proximity to non-native plant invasions.</p> <p>Because alpine vegetation and barren rock mainly occur in designated wilderness, roadless, or remote areas where human interference disturbance is minimal, alpine communities are considered to be relatively stable. However, 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</p>

Criteria	Rationale
	<p>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).</p> <p>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).</p> <p>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.</p> <p>Rare plant populations that may be small, isolated, tied to snowpack abundance and distribution timing 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. Changes in temperature and precipitation may also lead to greater variability in forb flowering, which could create an asynchronistic effect with native pollinator emergence (Halofsky et al. 2018; Miller-Struttman et al. 2015), leading to decreased reproduction in native plants. 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.</p> <p>The above analysis suggests that habitat for <i>B. glabella</i> has likely experienced low effects from natural and anthropogenic disturbances and trends are likely stable on the forest. However, climate change effects could lead to declining conditions, as described above.</p>

Criteria	Rationale
Threats to the Species and its Habitat on the Bridger-Teton National Forest	Population size appears to be very small, making the species vulnerable to chance disturbances. Otherwise, the habitat is highly protected and receives little use (Fertig 2000) as the entire state range is found within the Gros Ventre Wilderness Area in Bridger-Teton National Forest (WYNDD 2020b). The high-altitude habitat where <i>B. glabella</i> occurs receive minimal disturbance from forest management activities including recreation, motorized vehicle travel, and vegetation treatments.
Life history and demographic characteristics of the species	<i>Braya glabella</i> is a perennial herb with 1-many leafless stems 3.5-17 cm tall. Flowering stems and leaves are densely pubescent with simple or branched hairs. The somewhat fleshy basal leaves are entire or occasionally weakly-toothed, linear to broadly spoon-shaped, and 1-6 cm long. The inflorescence is a head-like cluster of white to purple-tinged, 4-petaled flowers 2.5-4.5 mm long. Frutis are oval to oblong, pubescent siliques 5-15 mm long with broad replum margins and a thick style 0.5-2 mm long. Flowering is from July to August (WYNDD 2020b).
Date: 3/19/20 Reviewer: L. Chipman	

Summary and Recommendations

Species (Scientific and Common Name): *Braya glabella* (crenulate moonwort)

Braya glabella is listed as S1 (critically imperiled) and G5 (secure) globally. It occurs from Alaska to Greenland and southward into the lower 48 states of the US, with disjunct populations in Colorado and Wyoming. Plants grow in barren, usually calcareous soils, gravel slopes and solifluction lobes. The Bridger-Teton Forests hosts two occurrences, and these represent all known populations in Wyoming. These two populations inhabit alpine turf on cliff rims and fellfields with *Dryas octopetala* and *Carex rupestris* (WYNDD 2020b).

Both occurrences fall within a few miles of each other in the Gros Ventre Wilderness above 11,000' elevation. Grazing livestock cannot access either population and the barren landscape is effectively impervious to fire, with no known activity within one mile. This habitat is more or less unsuitable for invasive species known to Wyoming, and there are no reported non-natives within one mile. Both occurrences have non-motorized hiking trails within a mile and this may present a slight potential for human presence and trampling impact. The remote, rugged locations likely seldom see human visitors and so the chance for recreational impact is minimal.

Long term changes in mean annual temperature and precipitation are projected to 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). The anticipated long-term changes in climate may also reduce reproductive output, germination and seedling survival due. Climate change related impacts represent the only significant threat to the persistence of *Braya glabella* and it is therefore not recommended for inclusion as a SCC. That said, a broader effort to monitor health and stability of alpine habitats would greatly inform the need for increased conservation status.

Evaluator: Jessica Irwin & Rose Lehman Date: 5/6/2020; 1/13/21

References

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