

<b>SPECIES: Scientific [common]</b>	<i>Botrychium simplex</i> [Least grape-fern]
<b>Forest:</b>	Bridger-Teton National Forest
<b>Forest Reviewer:</b>	<b>J.Irwin 9/30/2020; R.Lehman 10/05/2020</b>
<b>Date of Review:</b>	<b>10/05/2020</b>
<b>Forest concurrence (or recommendation if new) for inclusion of species on list of potential SCC: (Enter Yes or No)</b>	<b>No</b>

**FOREST REVIEW RESULTS:**

- The Forest concurs or recommends the species for inclusion on the list of potential SCC:  
Yes \_\_\_ No X
- 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:**

- Is the Species Native to the Plan Area? Yes X No \_\_\_  
  
If no, provide explanation and stop assessment.
- 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 <sup>1</sup>
1980 Element Occurrence 8	1 Collection (rare)	Corral Creek, Lincoln County. Greys River Ranger District	Rare among talus boulders with <i>Arnica</i> and <i>Carex</i> . Elevation 9400 ft.	Robert W. Lichvar Collection #3923 (Anderson 2006, WYNDD 2019, Rocky Mountain Herbarium 2019)
1984 Element Occurrence 10	1 Collection	Outside BTNF (over 15 miles east): Southeastern Absarokas: ridge N of Ramshorn Basin and vicinity of Deacon Lake.	Coniferous forest, grassy ridge, and high basin with internal drainage; grassy slopes. Elevation 9400-10000 ft.	Ronald L. Hartman Collection #18845 (Rocky Mountain Herbarium 2019)
1984	2 Collections	Outside BTNF (over 25 miles east): Absaroka Mountains: 29 air mi SW	Riparian areas adjacent to <i>Picea engelmannii</i> and <i>Abies lasiocarpa</i> forest;	Ruth E. B. Kirkpatrick Collection #5317

		of Meeteetse; at Kirwin in the vicinity of the junction of the North Fork Wood River and Cascade Creek.	moist creek banks. Elevation 9300 ft.	and 5317a (Rocky Mountain Herbarium 2019)
1997	1 Collection	Gros Ventre Range: Jackson Ranger District, west slope of Corner Mountain, approximately 2 air miles E of Granite Falls, above tributary wash of Swift Creek, approximately 3/4 air mile W of MacLeod Lake.	Open, moist clay soil below white limestone boulders at timberline. Community of <i>Antennaria media</i> / <i>Phlox pulvinata</i> with 60% vegetative cover. Elevation 10000 ft.	Walter Fertig Collection #17953 (Rocky Mountain Herbarium 2019)

<sup>1</sup>The Consortium of Pacific Northwest Herbaria (Consortium of Pacific Northwest Herbaria 2019) and the SEINet data portal (SEINet 2019) were also searched, and no additional occurrences on the Bridger-Teton National Forest were found.

- 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?

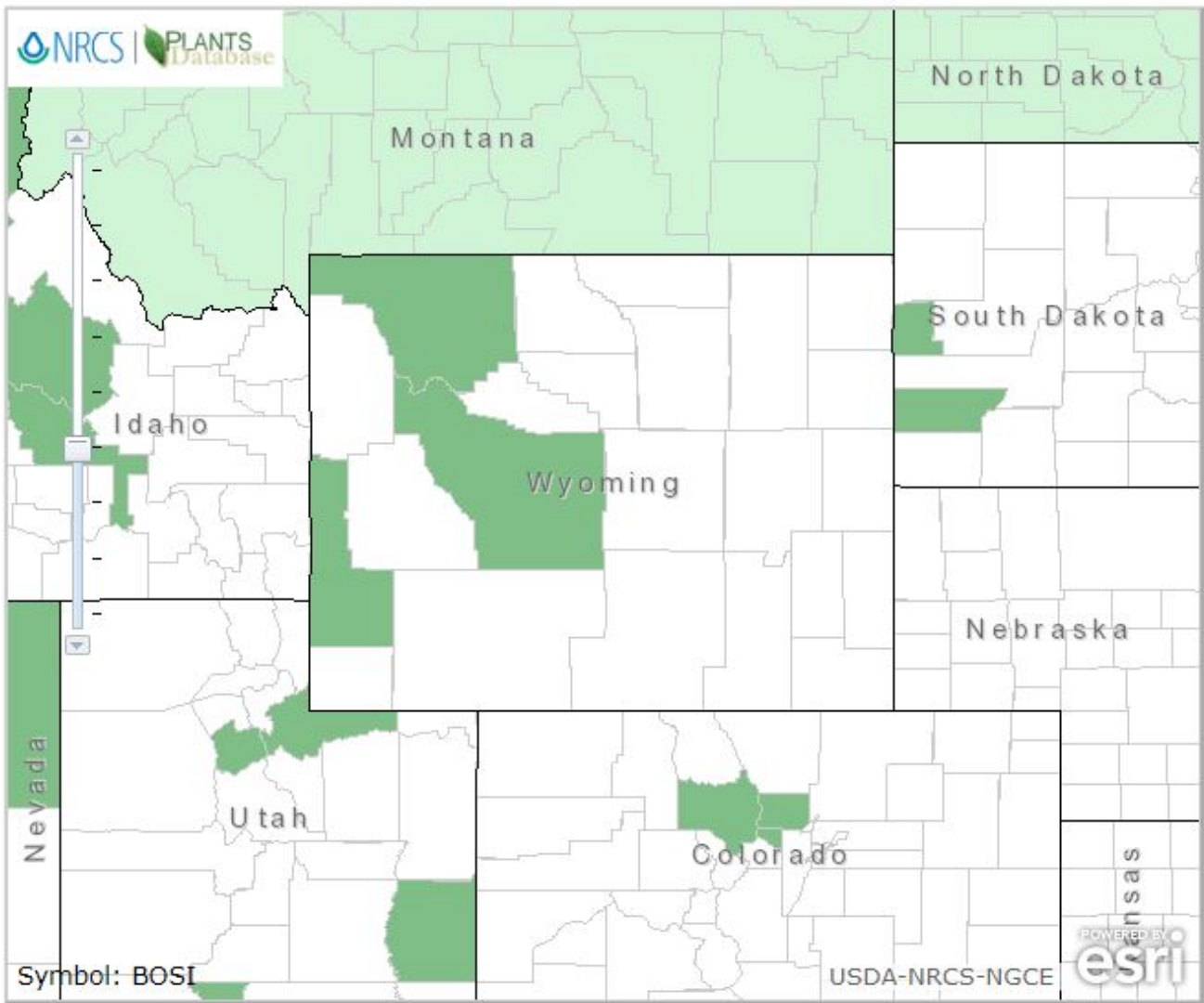
Yes \_\_\_ No \_\_\_

Provide explanation for determination

N/A – occurrences have been documented since 1990.

If determination is no, stop assessment

d. **Map 1**, *B. simplex* range in Wyoming and surrounding states (NRCS 2019).

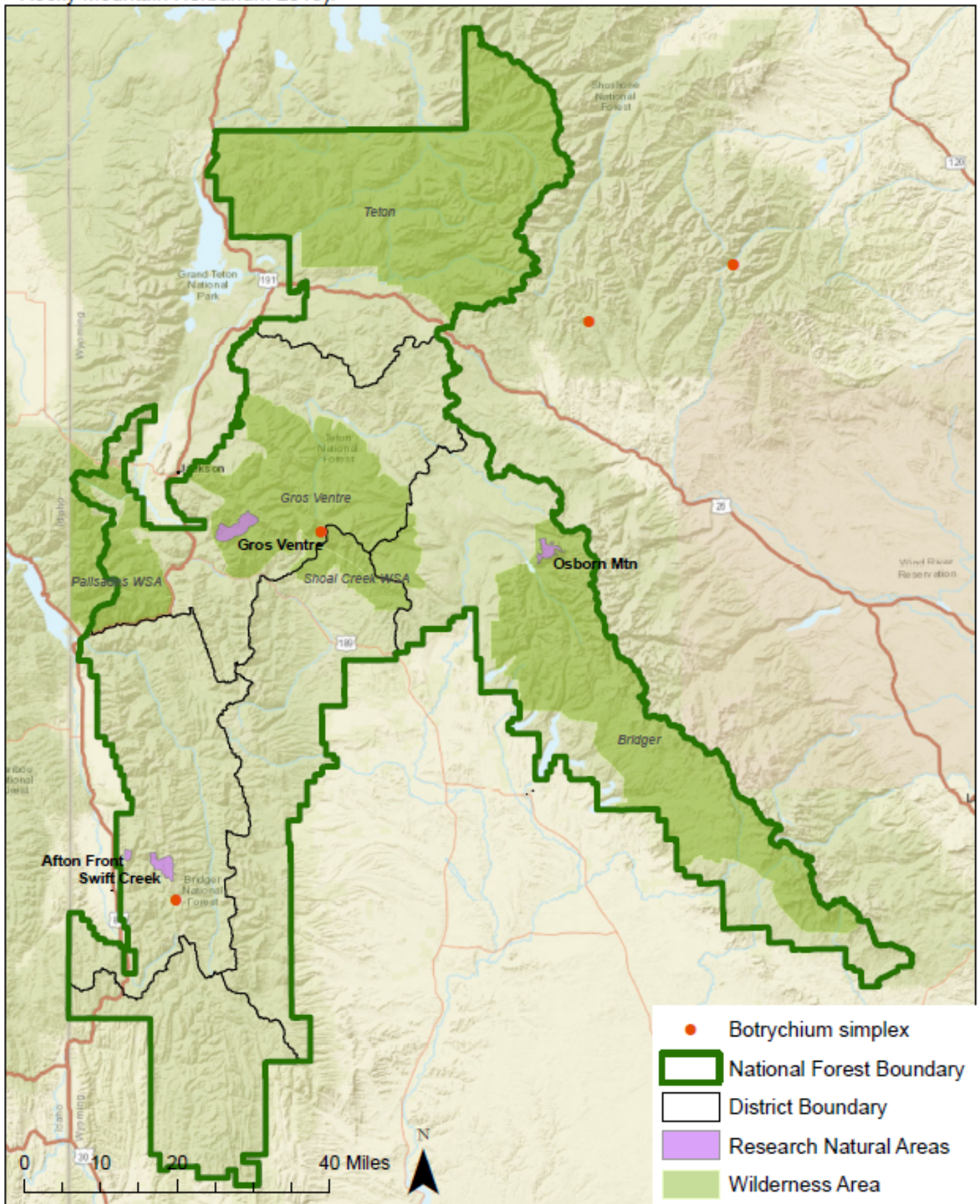


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| <span style="display:inline-block; width:15px; height:15px; background-color:#388e3c; border:1px solid black;"></span> Native                 | <span style="display:inline-block; width:15px; height:15px; background-color:#3498db; border:1px solid black;"></span> Introduced                 | <span style="display:inline-block; width:15px; height:15px; background-color:#d35400; border:1px solid black;"></span> Both                 | <span style="display:inline-block; width:15px; height:15px; border:1px solid black;"></span> Absent/Unreported |
| <span style="display:inline-block; width:15px; height:15px; background-color:#c8e6c9; border:1px solid black;"></span> Native, No County Data | <span style="display:inline-block; width:15px; height:15px; background-color:#aed681; border:1px solid black;"></span> Introduced, No County Data | <span style="display:inline-block; width:15px; height:15px; background-color:#f1c40f; border:1px solid black;"></span> Both, No County Data |                                                                                                                |

Native Status:

- |                                                                                                                                               |                                                                                                                                              |                                                                                                                    |                                                                                                                    |                                                                                                                    |                                                                                                                     |                                                                                                                                               |                                                                                                                                              |                                                                                                                     |                                                                                                                    |
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| <span style="display:inline-block; width:15px; height:15px; background-color:#388e3c; border-radius:50%; border:1px solid black;"></span> L48 | <span style="display:inline-block; width:15px; height:15px; background-color:#388e3c; border-radius:50%; border:1px solid black;"></span> AK | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> HI | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> PR | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> VI | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> NAV | <span style="display:inline-block; width:15px; height:15px; background-color:#388e3c; border-radius:50%; border:1px solid black;"></span> CAN | <span style="display:inline-block; width:15px; height:15px; background-color:#388e3c; border-radius:50%; border:1px solid black;"></span> GL | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> SPM | <span style="display:inline-block; width:15px; height:15px; border-radius:50%; border:1px solid black;"></span> NA |
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**Map 2.** *B. simplex* occurrences in Bridger-Teton National Forest vicinity (WYNDD 2019; Rocky Mountain Herbarium 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	<b>G5— Secure</b> <i>Common; widespread and abundant</i>
NatureServe State Status	<b>S2— Imperiled</b> <i>At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors</i>
State of Wyoming	Not listed
WYNDD	Not listed
USDA Forest Service	<b>Region 4 Sensitive</b>  <i>Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by</i> <ul style="list-style-type: none"> <li><i>a. Significant current or predicted downward trends in population numbers or density.</i></li> <li><i>b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.</i></li> </ul> (FSM 2670.5 – Threatened, Endangered & Sensitive Species)
USDOI FWS	Not listed
USDOI BLM	Not listed
IUCN	Not listed

Sources: WYNDD 2019; Heidel 2018; USDA Forest Service Regions 2 and 4 Sensitive Species Lists; NatureServe 2019

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

Criteria	Rationale
Distribution on the Bridger-Teton National Forest	Only two occurrences have been documented on the BTNF, one of which was in 1980. We are not aware of any recent surveys for this species on the BTNF. However, the ephemeral appearance of the above-ground portion of the plants and variable number of above-ground stems make assessing population numbers, and thus distribution, difficult (Zika et al. 1995; Ahlenslager and Potash 2007). Therefore, the distribution of <i>B. simplex</i> on the BTNF is likely not well-known, but only two occurrences on the Forest suggests that the species is scarce and isolated. One occurrence is located within the Gros Ventre Wilderness (Map 2).

Criteria	Rationale
Distribution outside the Bridger-Teton National Forest	<p><i>Botrychium simplex</i> is widespread and occurs at high elevations from California east to North Carolina and north to Alaska and Newfoundland. It typically occurs at low abundance in many states and/or provinces in its range (Farrar 2011; NatureServe 2017).</p>
Abundance on the Bridger-Teton National Forest	<p>Only two occurrences have been documented on the BTNF. The occurrence in 1980 was described as consisting of 1 individual, while the abundance of the more recent occurrence is unknown. Given the lack of abundance surveys for this species on the BTNF, abundance is not well known, but the species typically occurs at low abundance throughout its range (Farrar 2011; NatureServe 2017). This information indicates that abundance is likely also rare on the BTNF (Anderson 2006; WYNDD 2019).</p> <p>Although the entirety of BTNF has not been floristically inventoried, some areas within and adjacent to BTNF have been surveyed over the years. This species was not documented during these survey efforts:</p> <ul style="list-style-type: none"> <li>• Afton Front Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994a)</li> <li>• Horse Creek Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994b)</li> <li>• Swift Creek Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994c)</li> <li>• Sensitive plant surveys and status of rare plant species on Bridger-Teton National Forest, 1997-1998 (Fertig 1999)</li> <li>• Rare Species and Riparian Vegetation of the Snake River Basin in Wyoming (Jones et al. 2001)</li> <li>• Survey for <i>Stephanomeria fluminea</i> on the Bridger-Teton National Forest (Markow 2004)</li> <li>• Wyoming Plant Species of Concern on Caribou-Targhee National Forest: 2007 Survey Results Teton and Lincoln counties, Wyoming (Mancuso and Heidel 2008)</li> <li>• A Floristic Inventory of Grand Teton National Park, Pinyon Peak Highlands, and Vicinity, Wyoming U.S.A (Kesonie and Hartman 2011)</li> <li>• Blackrock Creek Wild and Scenic River Botany Survey (Johnson 2011)</li> <li>• Sensitive and rare plant species inventory in the Salt River and Wyoming Ranges, Bridger-Teton National Forest (Heidel 2012)</li> <li>• Teton to Snake Fuels Management Project Botany Report and Biological Evaluation (Englebert 2013)</li> <li>• Botany inventories in select fens of the Caribou-Targhee and Bridger-Teton National Forests (Heidel 2019).</li> </ul>
Population Trend on the Bridger-Teton National Forest	<p>We are not aware of any recent surveys for this species on the BTNF. As such, there is insufficient information to access this criterion.</p>

Criteria	Rationale
<p>Habitat Trend on the Bridger-Teton National Forest</p>	<p><i>Botrychium simplex</i> occurs in a wide variety of habits including meadows, barrens, woods, dry fields, marshes, bogs, wetlands, and stream edge vegetation. It usually grows in subacid soils (Anderson 2006). Within these habitats, plants may grow among sparse vegetation under full sun exposure or among tall dense herbaceous vegetation (Farrar 2011). The 1980 occurrence on BTNF was observed at an elevation of 9,400 ft, “among talus boulders with Arnica and Carex” (Anderson 2006), and the 1997 occurrence was “above tributary wash of Swift Creek” (Rocky Mountain Herbarium 2019).</p> <p>Varietal differences in habitat affinities may exist (Anderson 2006). Disturbance may be a habitat attribute, as some populations occur on disturbed areas such as borrow pits, tailings ponds, road shoulders, and old roadbeds as well as disturbed seral lodgepole pine forests (Anderson 2006).</p> <p>Given the wide range of variety of <i>B. simplex</i> habitats, suitable habitat is likely relatively common on the Forest and trends are variable. Without periodic light disturbance (e.g., removal or thinning of shrub and forest canopy to expose mineral soils) or management to maintain suitable habitat (e.g., maintenance of shrub canopy closure levels via livestock grazing or vegetation treatments), suitable habitat may decline in extent and quality as old disturbances revert to late seral stages (Ahrensleger and Potash 2007).</p>
<p>Threats to the Species and its Habitat on the Bridger-Teton National Forest</p>	<p>Observations and quantitative data suggest several threats to the persistence of <i>B. simplex</i> over its range including road construction and maintenance, timber harvest, recreation, fire, grazing, effects of small population size, woody plant encroachment, exotic species invasion, succession, global climate change, and pollution (Anderson 2006). The remote occurrences on the BTNF are removed from most of these threats.</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) were assessed at each occurrence (USFS GIS 2019, Google Earth Pro 2019). The following summarizes identified disturbances for each occurrence in BTNF:</p> <ul style="list-style-type: none"> <li>• 1980 Collection #3923: Outside of wilderness. In Three Forks allotment. Adjacent to moderately developed Sheep Pass motorized trail. Potential motorized vehicle impacts may occur. No other disturbances documented within a mile.</li> <li>• 1997 Collection #17953: In Gros Ventre Wilderness. High alpine habitat with no disturbances documented within 0.6 mile.</li> </ul>

Criteria	Rationale
<p>Life history and demographic characteristics of the species</p>	<p>Species of <i>Botrychium</i> typically self-fertilize and may have large potential for migration under suitable dispersal conditions as individual plants can produce thousands of spores (Farrar 2011). The germination needs of <i>Botrychium</i> spores are not well known, but it is likely that spores are dormant until the appropriate light, moisture, and mycorrhizal conditions exist (Johnson-Groh et al. 2002). <i>Botrychium</i> species are characterized by small stature, slow relative growth rates, and small propagules. A distinguishing characteristic of plants is the ability to withstand stressful conditions during growth. <i>Botrychium simplex</i> typically takes about 5 years to produce its first emergent leaf, but it may produce a small, aboveground, fertile frond in one year (Anderson 2006).</p> <p>Most of the life cycle of <i>Botrychium</i> species occurs underground, and very little about this part of the life cycle is understood. <i>Botrychium</i> species rely on mycorrhizal interactions in each of their life stages, and mycorrhizae may be crucial to the establishment and persistence of the species by allowing plants to survive aboveground disturbance (Johnson-Groh et al. 2002). <i>Botrychium</i> species may be relatively stress-tolerant because they are short-lived perennial species with mycorrhizal associations and become dormant during times of stress or disturbance (Johnson-Groh et al. 2002). This trait may reduce vulnerability to the stressor described above and indicate a high ability to recover from disturbance.</p>
<p>Date: September 4, 2019 Reviewer: L. Chipman</p>	

## Summary and Recommendations

Species (Scientific and Common Name): *Botrychium simplex* (Least grape-fern)

*Botrychium simplex* is listed as S2 (imperiled) and G5 (secure) globally. It is described from a wide variety of habits in often subacid soils. Habitats include borrow pits, tailings ponds, road shoulders, meadows, barrens, woods, dry fields, seral lodgepole pine forests, wetlands and riparian areas. It is found throughout North America at typically high elevations. Populations on the Bridger-Teton are small, as typical with occurrences range-wide.

One of the challenges with locating populations of *B. simplex* is that the plants spend much of their life cycle below ground, dependent on mycorrhizal interactions. Despite significant botanical surveys within and adjacent the forest, there remains only two known occurrences. The first was documented in the Salt River Range in 1980, and the second in the Gros Ventre Wilderness in 1997. There have been no recent re-surveys of the two populations and trend data is therefore unavailable.

Disturbance may be a habitat attribute, where old disturbances or low intensity disturbances act to maintain adequate levels of sunlight, soil moisture and plant community composition. While suitable habitat is likely relatively common on the forest, the disturbance trends vary widely. The occurrence in the Salt River Range is adjacent to the Sheep Pass motorized trail and could be impacted by vehicle use. The Gros Ventre population occurs inside wilderness and is unlikely to be affected by management or recreational activity. Given the abundance of potential habitat and variable dependence on disturbance events, it is recommended that *Botrychium simplex* not be included as a SCC.

Evaluator: Jessica Irwin Date: 9/30/2020

## References

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