SPECIES: Scientific [common]	*Lesquerella carinata var. carinata* [Keeled bladderpod] Other scientific names: *Physaria carinata* ssp. *carinata*
Forest:	Bridger-Teton National Forest
Forest Reviewer:	R.Lehman
Date of Review:	4/30/20; 4/3/2021
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
7/8/1992	Unknown	U.S.A., Wyoming, Teton County: Teton Pass. **On Bridger-Teton National Forest boundary.** 220705.080588, 482724.609522	Rocky meadow openings in spruce-fir forest. Occurs with *Linanthus nuttallii, Senecio strepanthifolius, Pedicularis contorta*. In fruit.	Erwin Evert # 23613. Element Occurrence Number: 3 (WYNDD GIS 2019)
6/16/1996	Ca 20000+ plants in 3	U.S.A., Wyoming, Teton County: Jackson Hole: mouth of Curtis Canyon	Whitish sandy-clay lower to mid-slopes with surface layer of limy	Walter Fertig, 16653. Element Occurrence

	subpopulations	at **Bridger-Teton NF/National Elk Refuge boundary**, just E of Forest Road 30440, ca 5 air mi NE of Jackson. Elev. 6600-6800 ft. 43.5186° N, 110.6754° W; uncertainty 0.25 mi.	sandstone gravel; rock cover ca 40%; Bunchgrass and cushion plant community of *Leucopoa kingii, Elymus spicatus,* and *Poa secunda* with essentially no sagebrush. Phenology: flowering & fruiting. Mostly in fruit on lower slopes; in flower and fruit on upper slopes. Vegetative rosettes and first or second year "seedlings" also common. Locally abundant. Distribution patchy. Density up to 22 plants per square meter. Ca 20000+ plants in 3 subpopulations	Number: 5 (Rocky Mountain Herbarium 2020; WYNDD GIS 2019)
6/18/1996	Ca 8000-10,000 plants in 3 subpopulations	U.S.A., Wyoming, Teton County: Jackson Hole/foothills Gros Ventre: foothills on west side of Sheep Mountain, ca 4.5 mi S of Kelly. 43.5618° N, 110.6156° W; uncertainty 1 mi.	Elev. 7200-7500 ft. Sparsely vegetated bunchgrass-cushion plant communities on east to south facing slopes of dry, whitish sandy-limey soil with surface of cryptogam crusts and abundant whitish-gray sandy-limestone rocks. 80% in flower and fruit, 20% vegetative. Density as high as 20-24 plants per square meter. Ca 8000-10,000 plants in 3 subpopulations. Clumped distribution pattern, with individual clumps often widely scattered. Occurs with *Comandra umbellate, Chaenactis*.	Walter Fertig, 16661. Element Occurrence Number: 7 (Rocky Mountain Herbarium 2020; WYNDD 2019)
6/12/2006	Unknown	U.S.A., Wyoming, Teton County: Jackson Hole: along Pacific Creek below Pacific Creek Campground, ca 7.5 air	Elev. 7000 ft. Stony flats in valley bottom. Phenology: fruiting.	B. E. Nelson, 68721. Possibly Element Occurrence Number: 17

		mi NNE of Moran; ca 36 air mi NE of Jackson. 43.9345° N, 110.4468° W; GPS Reading		(Rocky Mountain Herbarium 2020; WYNDD 2019)

The Consortium of Pacific Northwest Herbaria and SEINet were also searched, and no additional occurrences were found (Consortium of Pacific Northwest Herbaria 2020; 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?

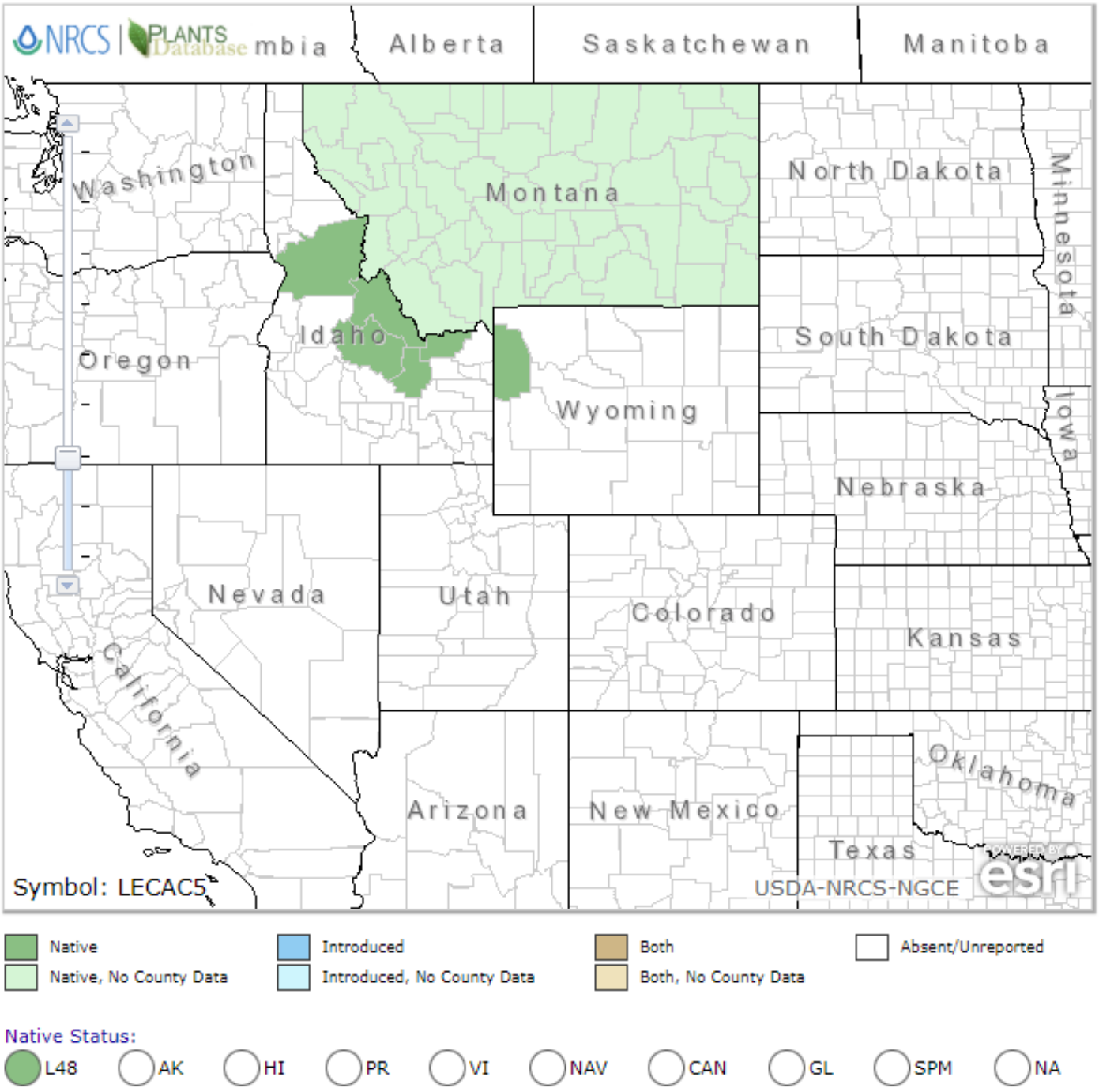
Yes___ No___

Provide explanation for determination

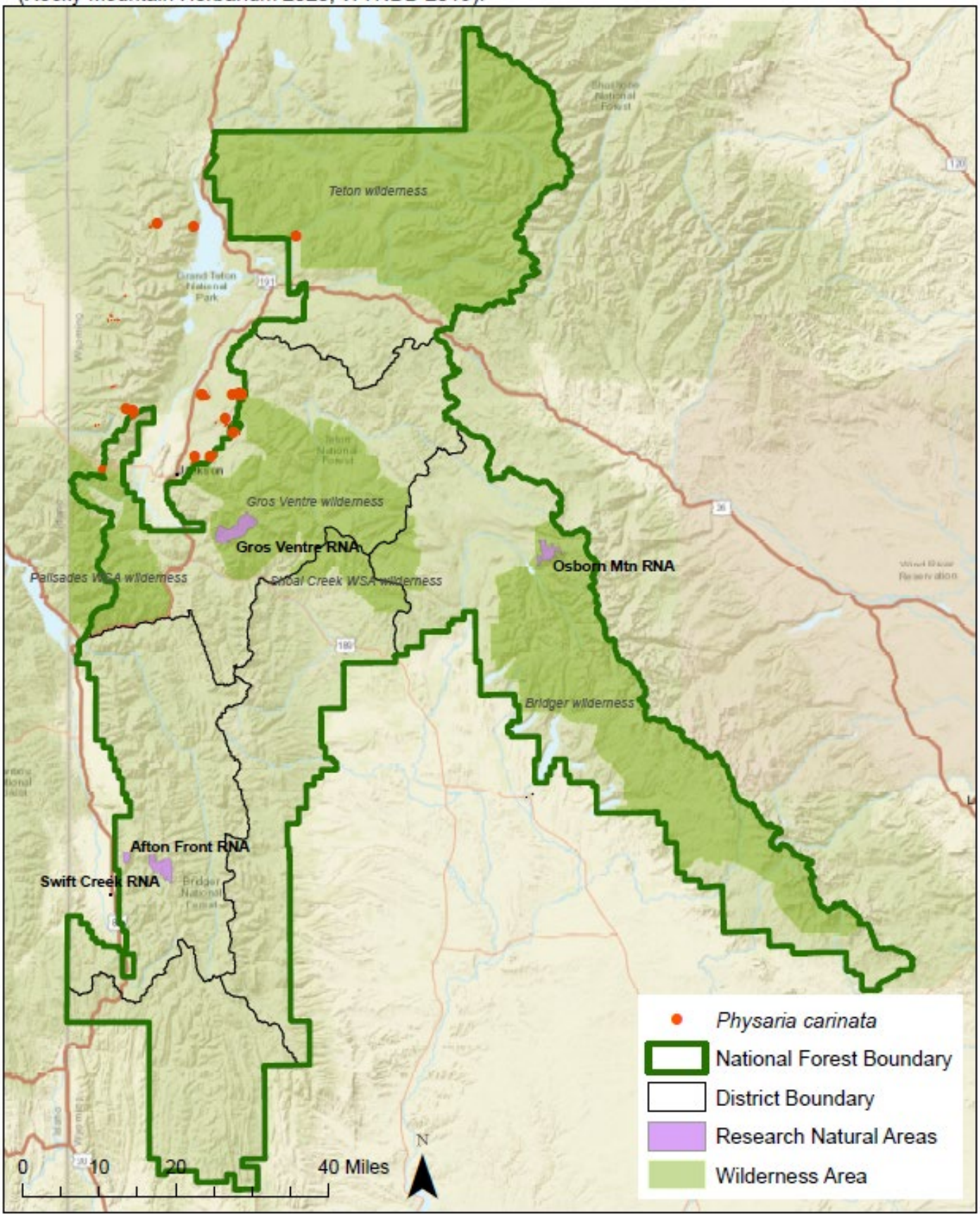
N/A–Occurrences have been documented since 1990.

If determination is no, stop assessment

Map 1, *Lesquerella carinata var. carinata* range in Wyoming and surrounding states (NRCS 2020).



Map 2, *P. carinata* occurrences in Bridger-Teton National Forest vicinity (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	**G3G4T4 – Vulnerable/Apparently Secure** **G3 -** *At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.* **G4 -** *Uncommon but not rare; some cause for long-term concern due to declines or other factors.* **T4** – *Taxon Apparently Secure*
NatureServe State Status	**S2—Imperiled** *At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.*
WYNDD	**Plant Species of Concern** *Species vulnerable to extirpation at the global or state level due to:* *a. their rarity (e.g., restricted distribution, small population size, low population density)* *b. inherent vulnerability (e.g., specialized habitat requirements, restrictive life history)* *c. threats (e.g., significant loss of habitat, sensitivity to disturbances)* (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	*Lesquerella carinata* var. *carinata* is known from four occurrences on the Bridger-Teton National Forest or overlapping the Forest boundary. Two of the occurrences consist of three subpopulations. All occurrences were discovered since 1990 and are located on the north-western potion of the Forest, primarily within rocky or shrubby openings (Table 1, Map 2).
Distribution outside the Bridger-Teton National Forest	This taxon is a regional endemic of eastern Idaho and northwestern Wyoming. In Wyoming, it is known only from Jackson Hole and the adjacent Teton and Gros Ventre Ranges (Teton County) (WYNDD 2020).
Abundance on the Bridger-Teton National Forest	1996 surveys estimated the state population at 50,000-60,000 individuals in 445 acres of habitat (Fertig 1997). Populations in Wyoming range in size from 1500-30,000 plants (WYNDD 2020). Individuals are often densely clustered, although clusters themselves may be widely scattered and patchy. Densities may be as high as 20-29 plants per square meter in favorable microsites. Reproductive plants have been observed to outnumber rosettes by a ratio of 4:1. Population size and vigor may vary from season to season in response to moisture availability (WYNDD 2020). Two collections on the Bridger-Teton National Forest were noted as locally abundant (Table 1), but since the populations have not been visited recently, current abundance is unknown.
Population Trend on the Bridger-Teton National Forest	Trend data are not available for most sites, but the species is thought to be stable at the present time. Some potential habitat has probably been lost as Jackson has expanded, suggesting that the species has experienced an historical decline.
Habitat Trend on the Bridger-Teton National Forest	This taxon occurs above timberline down to the sagebrush, including grassy slopes, *Juniperus*, *Cercocarpus*, and mountain shrub communities, roadcuts, usually on calcareous substrates, occasionally on decomposed basalt. Wyoming populations are in open ridgecrests, cliffs, talus and slopes. Soils are coarse and derived from limestone, slate and shale. Associated vegetation includes rocky sagebrush grasslands and cushion plant communities in rocky rubble openings, with *Leucopoa kingii*, *Elymus spicatus*, and *Poa secunda*, sometimes with *Artemisia tridentata* var. *vaseyana, Purshia tridentata, Chrysothamnus viscidiflorus, Abies lasiocarpa* and *Pinus albicaulis* (Fertig et al. 1994, Fertig 1997, Mancuso and Heidel 2008). It typically occurs in sites with low vegetative cover and little to no canopy. It does not appear to compete well in areas with dense or tall vegetation. 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). • Element Occurrence #3 (23613): 1992; occurrence polygon overlaps Palisades WSA wilderness, might be in or on edge of wilderness, but several non-motorized trails and state highway 22 (Teton Pass)

Criteria	Rationale
	overlap occurrence polygon; occurs near mapped (~50 acre) *Artemisia absinthium* invasion; not within perimeter of major fire event or RMU • Element Occurrence #5 (16653): 1996; not on wilderness or RNA; occurs near or along open, FS road; not within perimeter of major fire event or RMU; occurs near several small (<5 acre each) *Carduus nutans, Cynoglossum officinale*, and *Hyoscyamus niger* invasions • Element Occurrence #7 (16661): 1996; not on wilderness or RNA; occurs near or along open, FS road; not within perimeter of major fire event or RMU; occurs near two small (~1 acre each) *Carduus nutans* invasions • Element Occurrence #17 (68721): 2006; not on wilderness or RNA; occurs along open, FS road; within RMU; not within perimeter of major fire event or near mapped non-native plant invasion The above analysis suggests that *L. carinata var. carinata* occurrences in the plan area likely experienced moderate to high effects from natural and anthropogenic disturbances, and trends may be declining on the forest. Climate change effects could exacerbate declining conditions, as described below.
Threats to the Species and its Habitat on the Bridger-Teton National Forest	This species is potentially threatened by recreation, grazing, weed invasion and mining. Periodic disturbances, such as gopher activity or erosion from snowmelt, may be important in maintaining open habitats (WYNDD 2020). 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 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). In general, nonforest ecosystems of the Intermountain West have been affected by agriculture, livestock grazing, and invasive species (Halofsky et al. 2018). Climate change is likely a significant threat to nonforest 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, 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

Criteria	Rationale
	soil water deficit (Halofsky et al. 2018). 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 (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. Invasive plants have been identified as a major threat to the biological diversity and ecological integrity within and outside the BTNF. Invasive plants create many adverse environmental effects, including, but not limited to: displacement of native plants; reduction in functionality of habitat and forage for wildlife and livestock; threats to populations of threatened, endangered and sensitive species; alteration of physical and biological properties of soil, including productivity; changes to the intensity and frequency of fires; facilitation of further invasive species invasions; and loss of recreational opportunities (Halofsky et al. 2018). The presence of invasive plant species may be compounded by the presence of cattle which may create an environment more conducive to the establishment of invasive plant species (Halofsky et al. 2018).
Life history and demographic characteristics of the species	Keeled bladderpod is a densely pubescent perennial herb with decumbent stems to 15 cm long. The stem and basal leaves are silvery-pubescent and spoon-shaped. The 4-petaled flowers are yellow, 7.5-10 mm long, and arranged in a compact inflorescence. The pubescent fruits are oval, 5-9 mm long, flattened, and strongly keeled along the margins and partition, making them appear diamond-shaped in the cross-section. The flowering/fruiting period is from late May to August (Fertig 2008; WYNDD 2020).
Date: April 15, 2020 Reviewer: L. Chipman	

Summary and Recommendations
Species (Scientific and Common Name): *Lesquerella carinata var. carinata* [Keeled bladderpod] Other scientific names: *Physaria carinata* ssp*. carinata*
Lesquerella carinata var. carinata is listed as S2 in Wyoming and G3G4T4 globally. Wyoming Natural Diversity Database lists the species as a Plant Species of Concern. This taxon occurs above timberline down to the sagebrush, including grassy slopes, *Juniperus, Cercocarpus*, and mountain shrub communities, roadcuts, usually on calcareous substrates, occasionally on decomposed basalt. Wyoming populations are in open ridgecrests, cliffs, talus and slopes. Soils are coarse and derived from limestone, slate and shale. This taxon is a regional endemic of eastern Idaho and northwestern Wyoming. In Wyoming, it is known only from Jackson Hole and the adjacent Teton and Gros Ventre Ranges (Teton County) (WYNDD 2020). There are two known occurrences in the Snake River (Table 1 Map 2) on the BTNF. Surveys and information indicate that the taxon distribution doesn't extend north to the Teton Range. The Ferry Peak (EO #1) occurrences numbers in the 1000's. This species is potentially threatened by recreation, grazing, weed invasion and mining. Periodic disturbances, such as gopher activity or erosion from snowmelt, may be important in maintaining open habitats (WYNDD 2020). 1996 surveys estimated the state population at 50,000-60,000 individuals in 445 acres of habitat (Fertig 1997). Populations in Wyoming range in size from 1500-30,000 plants (WYNDD 2020). Individuals are often densely clustered, although clusters themselves may be widely scattered and patchy. Densities may be as high as 20-29 plants per square meter in favorable microsites. This analysis indicates that there are impacts to the species known occurrences and habitat but also that abundance of this regionally endemic species is relatively high where found. Based on this analysis it is recommended that *Lesquerella carinata var. carinata* not be included as a SCC. However, it is recommended that known occurrences continued to be monitored. As with essentially all plant species of concern on the BTNF, field surveys are needed.
Evaluator: Rose Lehman Date: 04/03/2021

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