SPECIES: Scientific [common]	*Pedicularis pulchella* [Mountain lousewort]
Forest:	Bridger-Teton National Forest
Forest Reviewer:	**R. Lehman**
Date of Review:	**3/35/20**
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 Description	Source of Information
1932	Unknown	Teton County, on the summit of sheep mountain.	Elev. 11,200 ft	Collector: O. J. Muire (Rocky Mountain Herbarium 2020; SEINet 2020)
1977	Unknown	Teton County: Gros Ventre Mountains: Sheep Mountain.	Elev. 11000 ft. Growing with *Salix arctica* and *Dryus octopetala*; frequent in open alpine meadow.	Collector: Robert W. Lichvar, #798 (Rocky Mountain Herbarium 2020; SEINet 2020)

1984	Unknown	Park County, In the vicinity of East Fork Pass and Cascade Creek Pass, south of Kirwin.	Elev. 10,900–11,900 ft. Scree slopes, and ridges.	Collector: Richard Scott, #3909 (Consortium of Pacific Northwest Herbaria 2020)
1994	Unknown	Teton County: Gros Ventre Area: southeast ridge and summit of Darwin Peak.	Elev. 11000-11647 ft. Rocky alpine slopes.	Collector Ronald with Tom Cramer L. Hartman, #49484 (Rocky Mountain Herbarium 2020; SEINet 2020)
1994	Unknown	Teton County: Gros Ventre Area: ridge 1 air mi SE to 2 air mi SSE of Pyramid Peak.	Elev. 10300-10879 ft. Alpine ridge, dolomite.	Collector: Ronald L. Hartman with Tom Cramer #48404 (Rocky Mountain Herbarium 2020; SEINet 2020)
1994	Unknown	Sublette County: Gros Ventre Area: Palmer Peak.	Elev. 10600-11400 ft. Rocky alpine slopes and summits, calcareous.	Collector: Ronald L. Hartman, # 49384 (Rocky Mountain Herbarium 2020; SEINet 2020)
1995	Unknown	Teton County, Gros Ventre Area: 0.8 air mi NNW to summit of Sheep Mountain	Elev. 10,400–11,200 ft. Meadow and boulder fields.	Collector: Ronald L. Hartman, #54129 (Rocky Mountain Herbarium 2020; SEINet 2020)
1998	Unknown	Teton County: Gros Ventre Range: southeast flank of Darwin Peak, ca 0.3 mi N of Brewster Lake.	Elev. 10600 ft. Steep, southeast facing limestone talus slope with sparse vegetation.	Collector: Laura Welp, #7899 (Rocky Mountain Herbarium 2020)
1998	Unknown	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.	Elev. 11000-11600 ft. Cushion plant community on gravelly dolomite rim of saddle above steep wall of limestone; vegetative cover up to 50%, rock cover ca 40%;	Collector Walter Fertig, #18513 (Rocky Mountain Herbarium 2020; SEINet 2020)

			dominants include *Phlox pulvinata, Astrgalus kentrophyta, Castilleja pulchella, Smelowskia, Carex nardina,* and *Dryas*.	

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?

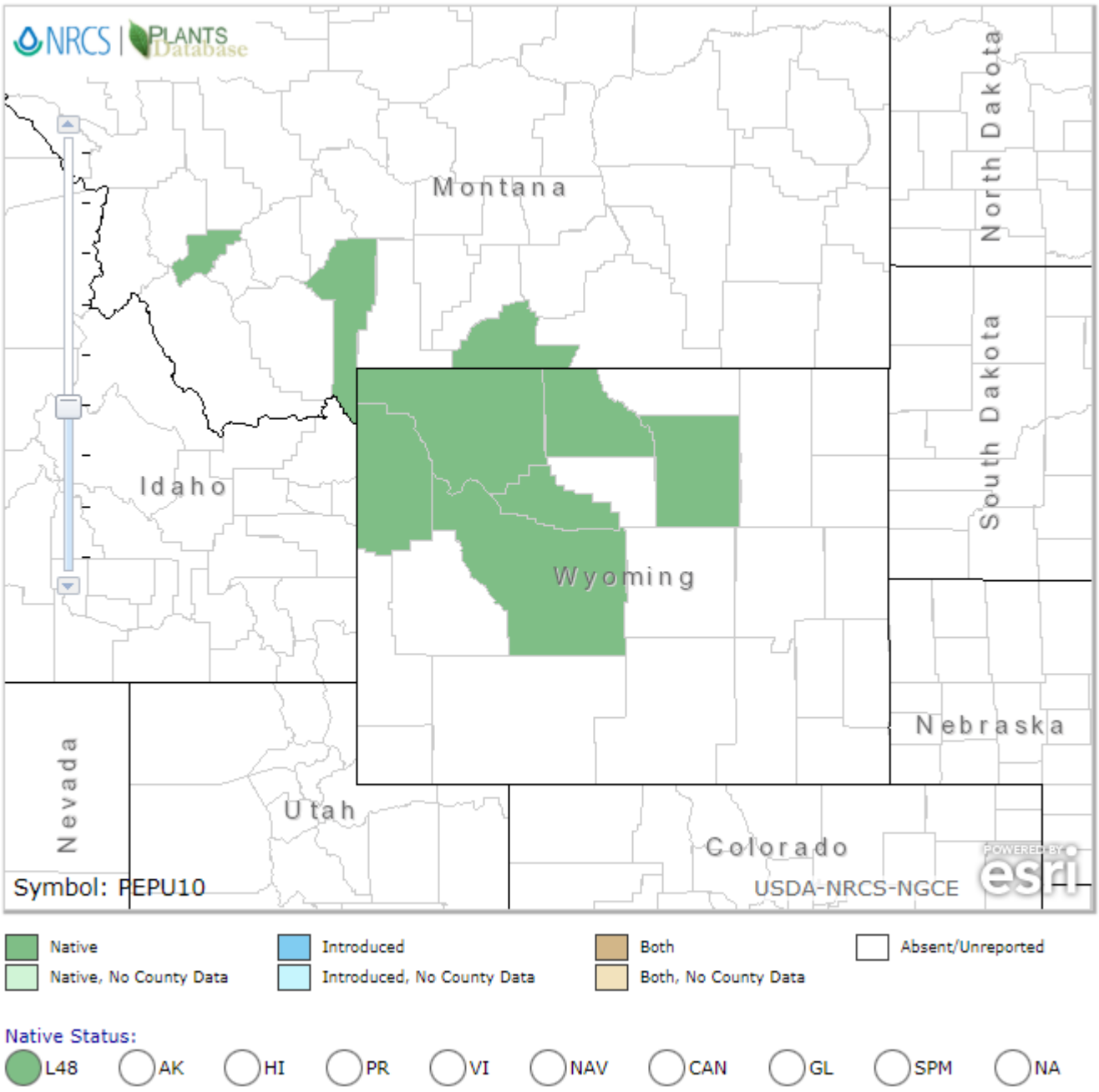
Yes___ No___

Provide explanation for determination

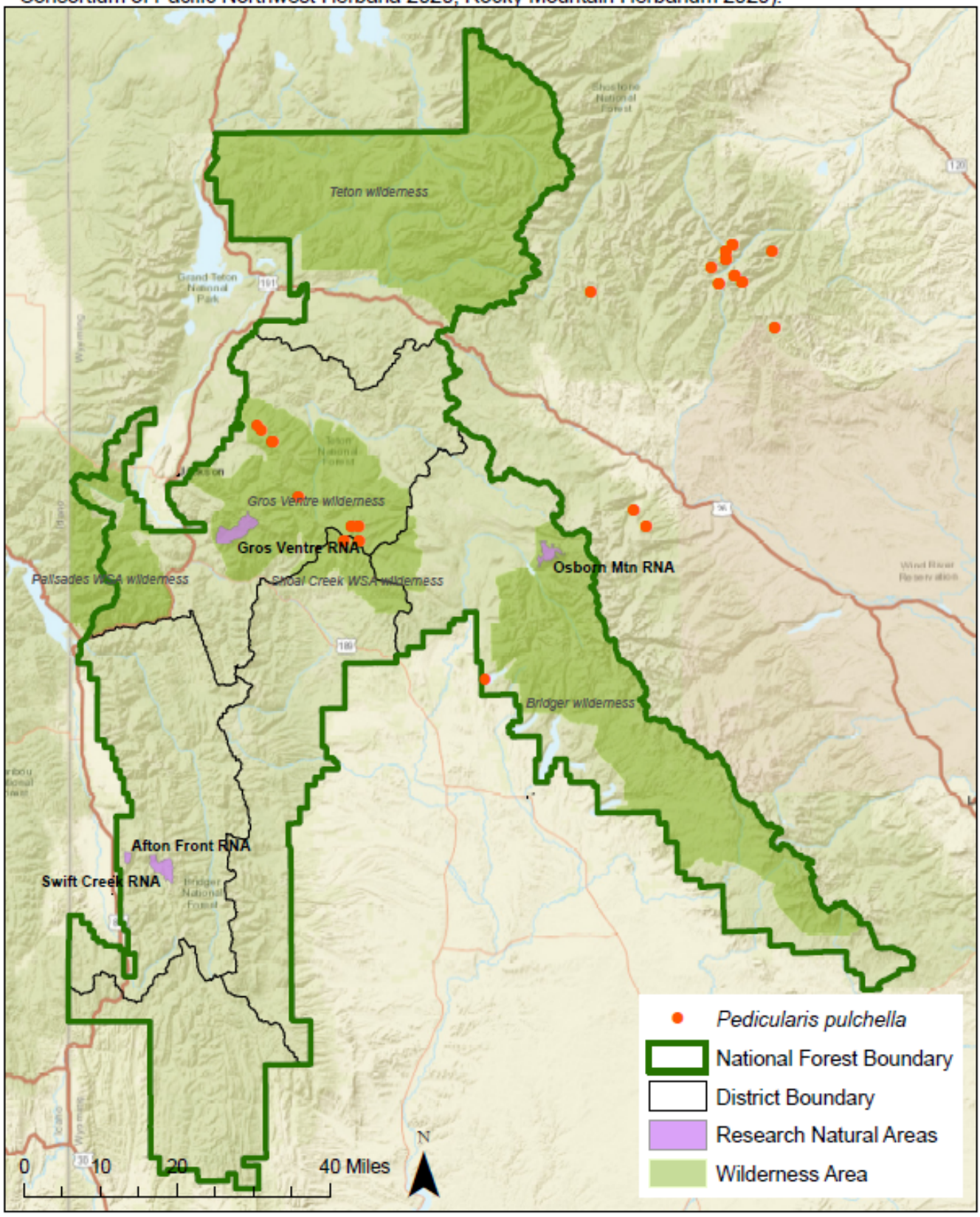
N/A–Occurrences have been documented since 1990.

If determination is no, stop assessment

Map 1, *Pedicularis pulchella* range in Wyoming and surrounding states (NRCS 2020).



Map 2, *P. pulchella* occurrences in Bridger-Teton National Forest vicinity (SEINet 2020; Consortium of Pacific Northwest Herbaria 2020; Rocky Mountain Herbarium 2020).



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	**G3— Vulnerable** *At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.*
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 Potential Concern** **G3/S2** *Species that appear to be secure at present, but because they have limited distribution as regional or state endemics they could become vulnerable under large-scale changes. Species with this status warrant periodic checks.* (Wyoming Natural Diversity Database - Species of Concern)
USDA Forest Service	Not listed
USDOI FWS	Not listed
USDOI BLM	Not listed
IUCN	Not listed

Sources: WYNDD 2020a; 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	*Pedicularis pulchella* is known from nine occurrences on the Bridger-Teton National Forest, six of which have been discovered since 1990. The occurrences are mainly within alpine meadows or rocky slopes of the central portion of the Forest (Table 1; Map 2).
Distribution outside the Bridger-Teton National Forest	This species is a regional endemic of southwestern Montana and northwestern Wyoming (NatureServe 2020). In Wyoming it is known to the Bighorn, Beartooth, Absaroka, Gros Ventre, and northern Wind River ranges in Big Horn, Fremont, Hot Springs, Johnson, Park, Sublette, and Teton counties (WYNDD 2020b).
Abundance on the Bridger-Teton National Forest	*Pedicularis pulchella* occurs infrequently in the southeastern Absaroka Range, but is common in alpine areas of Montana (NatureServe 2020). Population data are lacking for most occurrences, but the total range of the species is small (WYNDD 2020). It was described as "frequent" in one occurrence on the Forest in 1977 (Table 1).
Population Trend on the Bridger-Teton National Forest	Trend data are lacking, but populations appear to be stable (WYNDD 2000, 2020b).
Habitat Trend on the Bridger-Teton National Forest	This species inhabits alpine meadows dominated by *Geum rossii* turf and talus/scree slopes of granitic or calcareous parent material at 10300-12460 feet (WYNDD 2020b). Alpine habitats are likely stable on the forest but may decrease due to climate change effects (see below). To analyze trends in occupied 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 were assessed at each occurrence on the Forest (USFS GIS 2019, Google Earth Pro 2019). Known populations are located within the Gros Ventre designated wilderness area (Map 2). These high-altitude communities receive minimal disturbance from forest management activities including recreation, motorized vehicle travel, and vegetation treatments. Additionally, all occurrences appear to be in remote areas, away from motorized roads, which further confirms the low potential for human effects. Three occurrences (Murie, Hartman #54129, Welp #7899) are within ~1 mile of non-motorized trails, which may cause a slight increase in human presence but because the occurrences are in remote, alpine locations, they likely seldom see human visitors. None of the occurrences are in close proximity to large wildfires or mapped non-native plant invasions; it is, therefore, unlikely that populations and surrounding habitat have been affected by fire or invasive plants.

Criteria	Rationale
	Only one occurrence (Hartman #49384) is within an active grazing allotment. However, it is on a steep, high slope where cattle are unlikely to travel. Thus, impacts from livestock are also likely non-existent for all populations. The above analysis suggests that habitat for has likely experienced low effects from natural and anthropogenic disturbances.
Threats to the Species and its Habitat on the Bridger-Teton National Forest	Immediate threats are inferred to be low in the species' rocky alpine habitat (WYNDD 2020b). Alpine communities on the BTNF may be affected by recreation and climate change effects. Warming effects may change the distribution and establishment of alpine species such as *P. pulchella*. 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 (IAP) 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).The length and depth of snow cover, which are strongly correlated with mean temperature and precipitation, are key factors controlling alpine ecosystems. Snow cover provides frost protection for alpine plants in the winter, as well as the water supply in spring. 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). The composition and distribution of alpine ecosystems will be affected by decreasing snowpack, altering plant vigor and regeneration. Specific effects will depend on vulnerability thresholds of diverse species and the rate and magnitude of changes over time. Some species may be able to persist or migrate to suitable habitat, but the lower extent of some communities will be compromised by tree establishment (Halofsky et al. 2018). 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-Struttmann 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.

Criteria	Rationale
Life history and demographic characteristics of the species	Mountain lousewort is a low-growing, densely hairy perennial herb with stems mostly less than 1 dm tall. Basal leaves are twice-or thrice-divided and fern-like, 1-5 cm long, and 1 cm or less wide. Stem leaves are few and smaller than the basal ones. The inflorescence is a short, terminal spike, with a leaf-like bract at the base of each flower. Flowers are purple, with the petals united into a two-lipped structure, resembling a snapdragon. The flowering period is from July to August (WYNDD 2020b). Additional life history information for this species is unavailable.
Date: March 3, 2020 Reviewer: L. Chipman	

Summary and Recommendations
Species (Scientific and Common Name): *Pedicularis pulchella*
P. pulchella is listed as S2 (imperiled) and G3 (vulnerable) globally. It is a WYNDD Species of Potential Conservation Concern. This species is a regional endemic of southwestern Montana and northwestern Wyoming (NatureServe 2020). On the BTNF there are 6 documented occurrences. This species inhabits alpine meadows dominated by *Geum rossii* turf and talus/scree slopes of granitic or calcareous parent material at 10,300-12,460 feet (WYNDD 2020b). Alpine habitats are likely stable on the forest but may decrease due to climate change effects. Known populations are located within the Gros Ventre designated wilderness area and the aerial imagery along with a USFS GIS database analysis of known occurrences suggests that populations have likely experienced low effects from natural and anthropogenic disturbances. Because the majority (72 percent) of alpine vegetation in Wyoming is in wilderness areas (WGFD 2017), habitat for *P.pulchella* may be considered intact and stable. Long term change in snowpack and temperature is a main threat to these areas and may alter habitat conditions in the future. Given these considerations, it is recommended that *P.pulchella* not be managed as a SCC.
Evaluator: Rose Lehman Date: 03/28/2021

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