SPECIES: Scientific [common]	***Saxifraga chrysantha [*goldbloom saxifrage*]*** **Synonyms: *Saxifraga serpyllifolia* var. *chrysantha***
Forest:	Bridger-Teton National Forest
Forest Reviewer:	Randall Griebel
Date of Review:	10/14/2021
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
7/25/1973	Unknown	**On Border of Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: Wind River Range. In the vicinity of the Continental Divide. (Exact location unknown. Coordinates estimated by label maker. Possibly between Mile Long Lake where he collected on 24 Jul 1973	On ridgetop. Growing with *Papaver radicatum*	Jack Major, collector # unknown (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)

		and Faler Lake where he collected on 26.) Elev. 12200 ft. 43.351944° N, -109.693056° W		
8/17/1984	Unknown	U.S.A., Wyoming, Sublette County: West Slope Wind River Range: north side of Osborn Mountain at head of Mill Creek and ca 4 mi NE of Lower Green River Lake. Elev. 11600 ft. 43.334° N, 109.7849° W	Moist, rocky soil along tundra streamlets. Phenology: flowering & fruiting.	Erwin F. Evert, 7595. (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
7/21/2005	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Shale Mountain and notherly slope, ca 10 air mi SSW of Dubois. Elev. 11660-12430 ft. 43.3989° N, 109.6878° W to 43.3798° N, 109.6959° W to 43.3743° N, 109.7088° W	Rocky alpine meadow and riparian areas. Phenology: flowering.	Rob Massatti, 2827 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
8/7/2006	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Goat Flat, ca 3 air mi ENE of Downs Mountain. Elev. 11130-12350 ft. 43.3382° N, 109.5928° W to 43.3136° N, 109.6519° W	Rocky alpine meadow. Phenology: fruiting.	Rob Massatti, 8590 with Eric Everts (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
8/5/2005	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Horse Ridge, ca 23 air mi S of Dubois. Elev. 11470-12170 ft.	Rocky alpine meadow. Phenology: flowering.	Rob Massatti, 3667 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)

		43.2191° N, 109.543° W to 43.2202° N, 109.5683° W;		
8/6/2005	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Blaurock Pass and upper Dinwoody Creek, ca 22 air mi S of Dubois. Elev. 10400-12560 ft. 43.1741° N, 109.6073° W to 43.1977° N, 109.6163° W	Alpine scree. Phenology: flowering.	Rob Massatti, 3724 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
7/27/2006	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: I mi NW of summit of Gentlemans Pass; ca 6 air mi ESE of Gannett Peak. Elev. 10360-10970 ft. 43.1298° N, 109.5136° W to 43.1376° N, 109.5178° W	Talus and scree slope. Phenology: flowering & fruiting.	Rob Massatti, 8388 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
7/19/2006	Unknown	**Outside Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Windy Mountain, ca 8 air mi W of Shoshone Lake. Elev. 11610-12150 ft. 42.816° N, 109.1873° W to 42.8015° N, 109.1718° W to 42.7843° N, 109.1764° W; GPS Reading	Dry rocky alpine meadow. Phenology: flowering.	Rob Massatti, 7669 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)
7/29/2005	Unknown	**On Border of Bridger-Teton National Forest**: U.S.A., Wyoming, Fremont County: East Slope Wind River Range and Vicinity: Tayo Park to Coon Lake to Wind River Peak to Deep Creek	Rocky alpine meadow. Phenology: flowering.	Rob Massatti, 3315 (Rocky Mountain Herbarium 2021; SEINet 2021; WYNDD 2021a)

		Lakes, ca 16 air mi WSW of Lander. Elev. 10910-13210 ft. 42.7084° N, 109.1285° W to 42.7284° N, 109.0929° W		

The Consortium of Pacific Northwest Herbaria was also searched, and no additional occurrences were found (Consortium of Pacific Northwest Herbaria 2021).

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___ No__

N/A–No occurrences have been documented since 1990.

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?

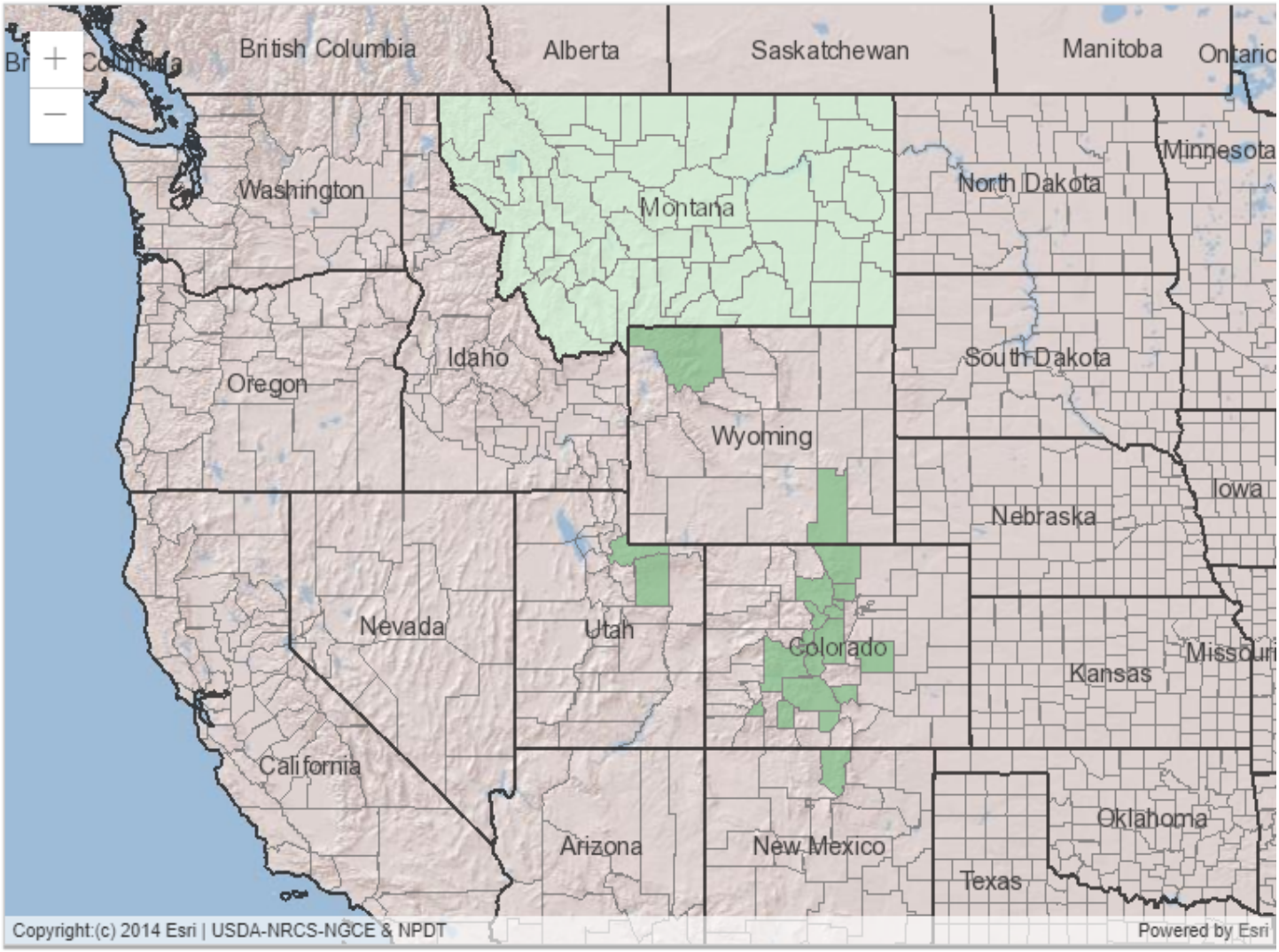
Yes_X__ No___

Provide explanation for determination

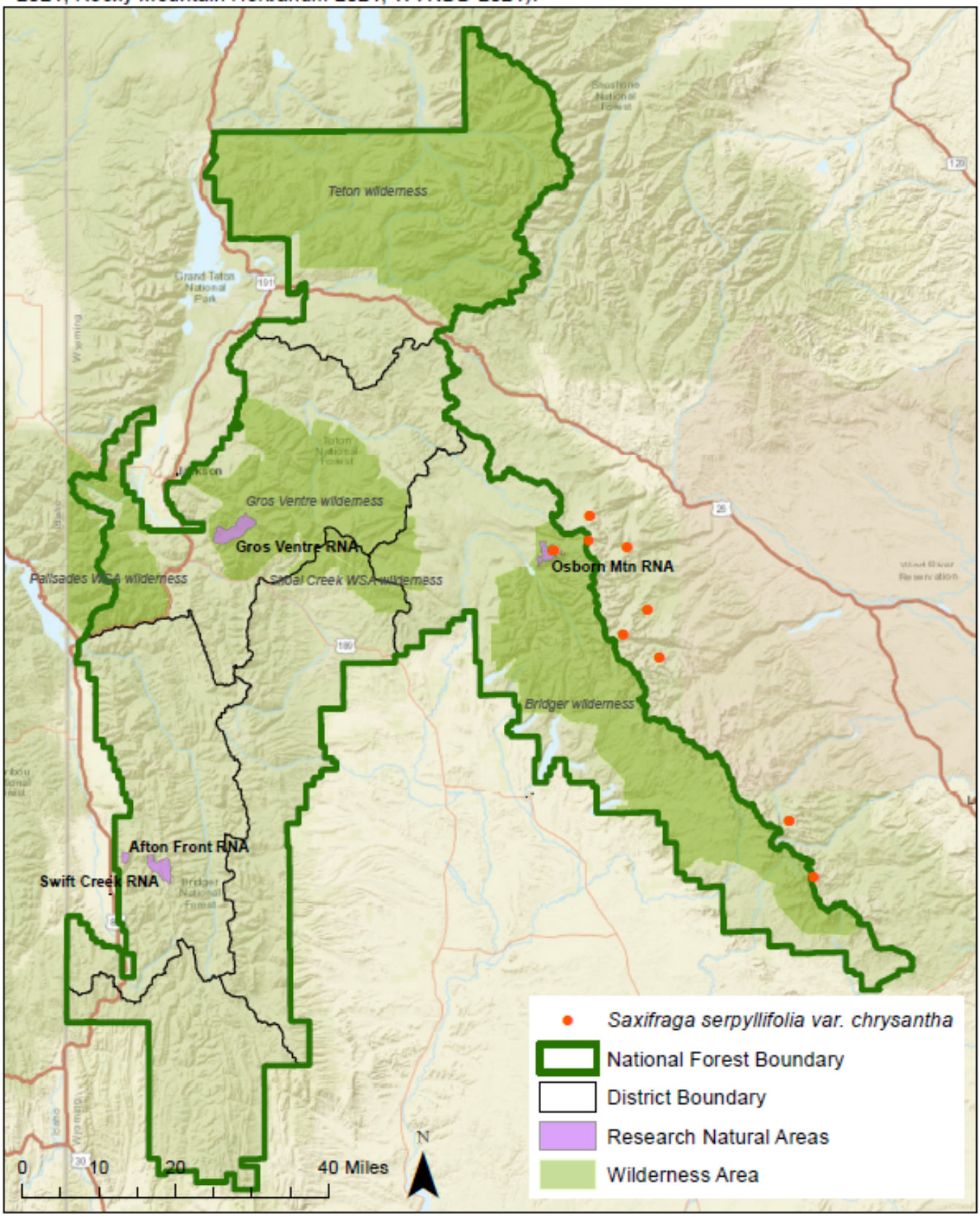
One recent occurrence (Massatti, 3315) has been documented on the border of the Bridger-Teton National Forest. The species may, therefore, be present within suitable habitat (alpine meadows and scree) on the Bridger-Teton National Forest, though surveys are needed to verify its presence.

If determination is no, stop assessment

Map 1, ***Saxifraga chrysantha*** in Wyoming and surrounding states (NRCS 2021).



Map 2, *S. serpyllifolia var. chrysantha* occurrences in Bridger-Teton National Forest vicinity (SEINet 2021, Rocky Mountain Herbarium 2021, WYNDD 2021).



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	**G4— Apparently Secure** *At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, 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 Concern** **G4S2** *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)*
USDA Forest Service	Not Region 4 Sensitive
USDOI FWS	Not listed
USDOI BLM	Not listed
IUCN	Not listed

Sources: Heidel 2018; IUCN 2021; NatureServe 2021; USDA Forest Service Regions 2 and 4 Sensitive Species Lists; WYNDD 2020b

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

Criteria	Rationale
Distribution on the Bridger-Teton National Forest	*Saxifraga chrysantha* is known from one occurrence on the Bridger-Teton National Forest in 1984, one historic (1973) and one recent (2005) occurrence on the border of the Forest, and several other occurrences on the East Slope Wind River Range that are in the vicinity of the Forest (Table 1, Map 2). These occurrences are primarily within rocky alpine meadows and talus scree. There may be more populations within suitable habitat on the Bridger-Teton National Forest, though surveys are needed for verification.
Distribution outside the Bridger-Teton National Forest	*Saxifraga chrysantha* occurs in the Rocky Mountains from Montana south to Utah and New Mexico. In Wyoming, it is known from the Beartooth, Medicine Bow, and Wind River Ranges (Carbon, Fremont, Park and Sublette counties) (Heidel 2018; WYNDD 2021b).
Abundance on the Bridger-Teton National Forest	*Saxifraga chrysantha* was reported as locally abundant at one site in the Snowy Range, but no population data are available from other sites (WYNDD 2021b). It is thought to be uncommon in Wyoming (Heidel 2018), and it may also be uncommon on the Bridger-Teton National Forest. However, as most records do not report abundance, overall abundance on the Bridger-Teton National Forest cannot be assessed.
Population Trend on the Bridger-Teton National Forest	Population trends for *S. chrysantha* in Wyoming, including on the Bridger-Teton National Forest, are unknown (Heidel 2018; WYNDD 2021b) due to lack of data.
Habitat Trend on the Bridger-Teton National Forest	Habitat is moist, sandy or gravelly soil on gentle alpine slopes and among boulders, often where snow lies late. Wyoming populations are on stony ridgecrests, fellfields and rocky slopes at or above timberline, often near snowbanks in well drained soils often in cushion plant communities (WYNDD 2021b). 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 2021). The occurrences within and on the border of the Bridger-Teton National Forest (Evert 7595, Masstti 3315, and Major #unknown) occur within or near the Bridger wilderness area, and Evert 7595 is also within the Osborn Mtn RNA. These occurrences likely experience minimal effects from anthropogenic activities due to protections afforded by these designations, such as management to preserve natural conditions. Additionally, occurrences within wilderness areas and RNAs are located outside of RMUs and are far from motorized roads or trails, which further confirms the low potential for human effects. Proximity of the Evert 7595 and Masstti 3315 occurrences to non-motorized hiking trails may slightly increase potential for human presence and trampling impacts, but because occurrences are in remote, rugged locations, they likely seldom see human

Criteria	Rationale
	visitors. The Evert 7595 and Major #unknown occurrences are in the vicinity (within 10 mi) of a large invasion of the non-native plant *Cirsium arvense*; if the invasion were to spread closer to the occurrences, it could compromise habitat conditions for the *S. chrysantha*. None of the occurrences are located within the perimeter of large fire events. The above analysis indicates habitat has likely experienced low levels of impacts from natural and anthropogenic disturbances. Climate change may lead to future habitat alterations as described below.
Threats to the Species and its Habitat on the Bridger-Teton National Forest	Immediate threats to *S. chrysantha* are inferred to be low due to its presence in alpine habitat though it may potentially be threatened by recreation (WYNDD 2021b). 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 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 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). 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). 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

Criteria	Rationale
	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. 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.
Life history and demographic characteristics of the species	*Saxifraga chrysantha* is a perennial herb with leafy stems 2-6 cm tall. The glabrous, fleshy leaves are linear-oblanceolate to spoon-shaped, entire, and borne in a tight basal rosette and scattered along the flowering stem. Stolons are absent. Flowers are usually solitary (occasionally 2-3) on each stem and have 5 golden-yellow, oval petals (5.5-7 mm long) and 5 reflexed sepals. The fruits are capsules with 2 curved beaks at the tip. Flowering is from July to August (WYNDD 2020b).
Date: October 7, 2021 Reviewer: L. Chipman	

Summary and Recommendations

Saxifraga chrysantha is ranked as apparently secure throughout its range but imperiled and a plant species of concern in Wyoming, where it is known from the Beartooth, Medicine Bow, and Wind River Ranges (Carbon, Fremont, Park and Sublette counties). There is one known occurrence on the Bridger-Teton National Forest from 1984, two occurrences on the border of the Forest, and several other occurrences on the East Slope Wind River Range that are in the vicinity of the Forest (Table 1, Map 2). It is thought to be uncommon in Wyoming and it may also be uncommon on the Bridger-Teton National Forest, but population trends are unknown due to lack of data. Habitat trends are likely stable as immediate threats are inferred to be low in the subspecies' remote, alpine, rocky habitat, which likely experiences minimal anthropogenic disturbance. However, vulnerability of alpine communities to climate change is high, and future habitat restrictions and other climate-change related effects may occur. Because *S. chrysantha* has not been documented on the Bridger-Teton National Forest since 1990, it is not recommended as a species of conservation concern at this time; if future surveys verify more recent occurrences on the Forest, the species should be reassessed.

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