

**Species:** *Minuartia macrantha* (Rydb.) House

Synonyms – *Alsinanthe macrantha* (Ryb.) W.A. Weber, *Arenaria macrantha* (Rydb.) A. Nelson ex J.M. Coult. & A. Nelson

Common names - House’s stitchwort, House’s sandwort

**Status:** Table 1 summarizes the current status of this plant by various ranking entities and defines the meaning of the status.

<b>Entity</b>	<b>Status</b>	<b>Status Definition</b>
NatureServe	G3	G3—Globally vulnerable - At moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.
Colorado Natural Heritage Program (CNHP)	S3	S3--State vulnerable; typically 21 to 100 occurrences.
USDA Forest Service	None	
USDI Fish and Wildlife Service	Not listed	Not federally recognized under the Endangered Species Act (ESA) as endangered, threatened, proposed, or candidate species.

The 2012 U.S. Forest Service Planning Rule defines Species of Conservation Concern (SCC) as “a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area” (36 CFR 219.9). This overview was developed to summarize information relating to this species’ consideration to be listed as a SCC on the Rio Grande National Forest, and to aid in the development of plan components and monitoring objectives.

**Distribution, abundance, and population trend on the planning unit:**

According to the USDA PLANTS database *Minuartia macrantha* is known from Utah and Colorado (USDA NRCS 2015). NatureServe reports that it is known from Utah, Colorado and possibly New Mexico (NatureServe 2015). While the Flora of North America (FNA 1993+) indicates that it’s more wide-spread, occurring in Wyoming, Colorado, New Mexico, Utah, Arizona and Nevada. However, the Flora of North America notes they are treating *Minuartia macracantha* and *Minuartia filiorum* as one species based on W.A. Weber’s herbarium annotations (FNA 1993).

In Colorado *Minuartia macrantha* is found in the high mountains in Dolores, Garfield, Gunnison, La Plata, San Juan, Pitkin, Park and Ouray Counties, only a small portion of which is found within the planning area. It is expected in the alpine areas of adjacent counties in the San Juan Mountains (which would be within the planning area) (Lyon and Hanson 2005).

There is one CNHP element occurrence record of *Minuartia macrantha* on the edge of the planning area (in the San Juan Mountains), it is unknown if the occurrence is actually on the Rio Grande National Forest (GIS data show it as outside the Forest). The occurrence was reported in 1983; CNHP reports that it has not been revisited and there is no data pertaining to the size or condition of the occurrence (CNHP 2015). Lyon and Hanson (2005) reported that the species appears to be quite common in the alpine areas of the San Juan Mountains, with 37 specimens from seven counties at the University of Colorado Herbarium.

There are no data on population trends for *Minuartia macrantha*. Population sizes have not been estimated and multi-year population or demographic monitoring has not been initiated for any site.

#### **USFS Corporate Database Habitat Type Associated with the Species:**

*Minuartia macrantha* is found in alpine tundra cushion plant communities and rocky areas both above and below timberline, at elevations from 10,000 to 13,500 feet. Frequent associates are *Silene acaulis*, *Phlox condensata* and *Lidia obtusiloba*. Soils are shallow and rocky. The point for the element occurrence that is reported for the RGNF is actually outside the Forest, so Land Type Association could not be determined using RGNF GIS data.

#### **CNHP Ecological System of the Southern Rocky Mountains Ecoregion:**

Rocky Mountain Alpine Fell-Field (CNHP 2005)

#### **Brief description of natural history and key ecological functions:**

*Minuartia macrantha* is a small caespitose perennial plant with glabrous foliage. Stems are 4 to 10 cm, and leaves are about 5 to 10 mm. Flowers are white, with the petals exceeding the sepals. Sepals are acute to acuminate, and three-nerved. It is found in alpine tundra cushion communities and rocky areas both above and below timberline, from 10,000 to 13,500 ft. (Lyon and Hanson 2015). Frequent associates are *Silene acaulis*, *Phlox condensata* and *Lidia obtusiloba*. Soils are shallow and rocky. CNHP reports that it has also been found in upper subalpine spruce-fir forests (Handwerk et al 2014).

Element occurrence (EO) reports for occurrences found outside the planning area (within the San Juan Mountains) report that the species is common on tundra, with a basic EO Rank of A – excellent estimated viability.

There have been no studies on the life history, demographic rates, fecundity (reproductive rate), or longevity of *Minuartia macrantha*.

The morphology of small tundra plants such as *Minuartia macrantha* helps them to increase survival in harsh alpine conditions such as cold temperatures, desiccating winds, intense solar radiation, and low moisture. When growing in exposed areas, these species must overcome environmental obstacles such as erosion/deposition, high water runoff, and intense solar radiation and wind. The low growth and small

size presumably keeps individuals out of harsh winds, reduces plant tissue growth needs, creates less distance to transport water, allows interception of both solar radiation and ground-reflected radiation, and affords protection to the inner parts of the plant.

Little is currently known about population demographics in *Minuartia macrantha*. There is no information regarding population parameters or demographic features, such as metapopulation dynamics, life span, age at maturity, recruitment, and survival. Demographic parameters, such as recruitment and survival rates, are not currently available so there are no definitive data regarding the vital rates that contribute to species fitness.

There is insufficient knowledge about *Minuartia macrantha* to determine what factors limit population growth. Population growth or establishment could be limited by competition with other species (e.g., invasive species), inadequate genetic variability for long-term persistence, ineffective pollination, or reduced habitat availability, as a result of human-related changes or environmental fluctuations. The rate at which colonization and establishment of new populations occurs is unknown and it is unclear what type, size, intensity, or frequency of disturbance regime is important. Genetic concerns, such as the amount of genetic variability between and within the occurrences, have not been studied.

#### **Overview of ecological conditions for recovery, conservation, and viability:**

There is a relatively large amount of alpine environment with potential habitat present in both the Sangre de Cristo Mountains and the San Juan Mountains within the RGNF. It is generally assumed that there are few threats to this species because of its largely inaccessible habitat. Alpine environments are generally intact with only minor and localized impacts.

Lyon and Hanson (2005) noted that the species does not seem to be threatened by current uses, although potential threats include sheep grazing, off-road vehicle use and global warming. Element Occurrence records for areas adjacent to, but outside of the planning area, note that the species is often found in areas near popular hiking or biking trails, but the plants do not appear to be threatened by the current level of use in the areas.

Although there are no reports of non-native invasive plant species specifically affecting *Minuartia macrantha*, invasive species are always a threat to rare plants. The potential for infestation in alpine habitat is reduced, however the potential ecosystem impacts from invasive species, such as their effects on pollinators, must also be considered. Because *M. macrantha* is found in areas of sparse vegetation, it might be a poor competitor, which may leave it vulnerable to negative impacts from invasive species.

A significant threat to alpine tundra plants is global climate change. In 2014, Climate Change Vulnerability Assessments were conducted for 60 of the plant species tracked by the CNHP, utilizing the NatureServe Climate Change Vulnerability Index (Handwerk et al. 2014). *Minuartia macrantha* was assigned a climate vulnerability score of Extremely Vulnerable for the San Juan region. The score was based on restriction to cold alpine environments, short seed dispersal distances, the presence of high mountains that serve as natural barriers in suitable habitat, and dependence on ice and snow. Alpine habitats are likely to be reduced as Colorado becomes warmer, and presumably drier. Climate models project earlier, faster snowmelt along with decreased summer precipitation and increased summer

temperatures. This could result in significantly lower amounts of water stored in alpine soils during the summer (Handwerk et al 2014).

Overall, based on current information, threats to *Minuartia macrantha* are considered relatively low. However, this should be tempered with the high number of unknowns for this species.

**Key ecosystem characteristics and ecological conditions for recovery, conservation, and viability:**

There is currently one known occurrence of this species on the RGNF, it is therefore critically important to maintain that occurrence. Presently, most threats appear to be at a relatively low and manageable level. Global climate change will likely affect all plant communities to an unknown degree over time. How this species will cope with this potential change is unknown, but, as discussed above, alpine habitats are expected to respond negatively to climate change.

The RGNF should strive to maintain habitat conditions for *Minuartia macrantha* by applying suggested management practices as follows:

- 1) Manage habitat - Manage and adjust pressures from any management influences found to be creating unacceptable impacts.
- 2) Manage environmental stressors - Continue assessing the RGNF's contribution to global climate change and adjust actions where permissible within the Forest Service's legal and regulatory authority. Use tools such as the Forest's Climate Change Scorecard to assess impacts and make positive changes where needed. Reductions in the RGNF's contribution to global climate change should benefit *Minuartia macrantha*.

**Key uncertainties and information needs/gaps:**

There are a large number of information gaps and research needs for this species. Re-visiting the known occurrence, estimating current abundance, assessing imminent threats, measuring demographic parameters, studying genetic variability, and determining ecological needs and limitations are of primary importance to further the understanding of *Minuartia macrantha*. The following suggestions are ordered from inventory activities (to determine the current status) to more complex biological studies (to help understand the species):

- Re-visiting and detailed mapping of the known population
- Surveying for new populations, especially in the San Juan Mountains
- Addressing any imminent threats to the known population
- Defining and measuring microhabitat characteristics
- Measuring demographic parameters using long-term monitoring plots
- Analyzing genetics to assess gene flow and variability throughout range

- Conducting studies related to reproductive biology, including breeding system, germination trials, dispersal capabilities, pollinator surveys, mycorrhizal associations, and seedbank analyses.

The following is an outline of a monitoring approach that could be used to inform the development of the RGNF Forest Plan revision's monitoring plan. Additionally, areas of research opportunity (beyond the scope of the Forest Plan revision) are suggested below based on key uncertainties about this species.

- 1) Monitoring: monitoring priority is a judgment determination based on number of occurrences, potential threats, and conservation status. The priority for this species is thought to be moderate. This is primarily due to the status being G3S3 (see Table 1) and very limited occurrences on the RGNF. Existing management practices are not known to be causing detrimental impact. Only limited search effort and monitoring have been conducted so individual occurrences may be vulnerable to unforeseen impacts. Thus, monitoring is suggested as follows:
  - a. Search for and document new species occurrences found on the Forest. Ensure that additional occurrences, as well as negative search results, are recorded in the appropriate electronic database. Additional occurrences increase the odds in the confidence of assessing population viability, especially with greater geographic separation. Finding additional occurrences helps inform whether additional monitoring is needed and at what intensity.
  - b. Monitor known element occurrences to document presence or absence. Evaluate each occurrence based on appropriate database protocols. Visually document the same populations every 5-7 years (twice in a planning cycle). Consider enlisting an organization such as CNHP to help develop a rapid monitoring technique that is meaningful for trend analysis but is easy to establish and simple to evaluate.
  - c. Make visual observations to assess if any impacts are occurring to the known occurrence. Assess the type, source, frequency, and magnitude of the impact. Develop a strategy at the appropriate time for mitigating impacts (eliminate, move, delay, or reduce the impact).
- 2) Research:
  - a. Reproductive biology, autecology, and demography - there are many unknowns about this species' life cycle suggesting numerous areas of potential research.
  - b. Genetics - an accurate estimate of this species' genetic vulnerability is unknown.
  - c. Disturbance - there are unknowns about the role and types of disturbance and their possible effects on *Minuartia macrantha*.
  - d. Environmental uncertainty:
    - i. Continue and/or expand studies on the effects of air pollution on alpine environments, plant communities and specifically on *Minuartia macrantha*.

- ii. Continue and/or expand studies on the effects of global climate change on alpine environments, alpine plant communities; and specifically on *Minuartia macrantha*.

**Key literature:**

Colorado Natural Heritage Program (CNHP). 2005. Ecological System Descriptions and Viability Guidelines for Colorado. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.

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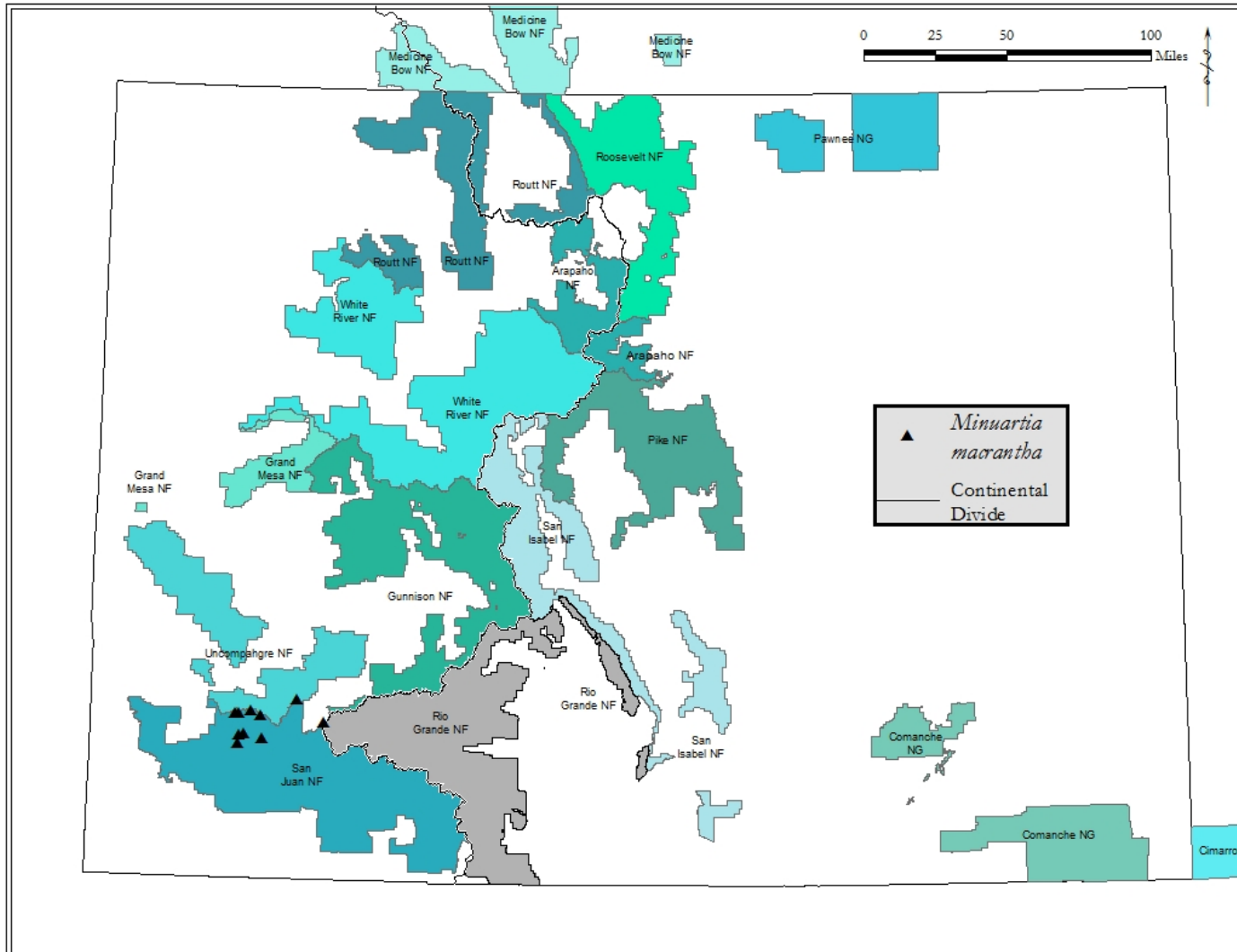
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NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: September 28, 2015).

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Map of Known Occurrences:



# Minuartia macrantha occurrence on the RGNF

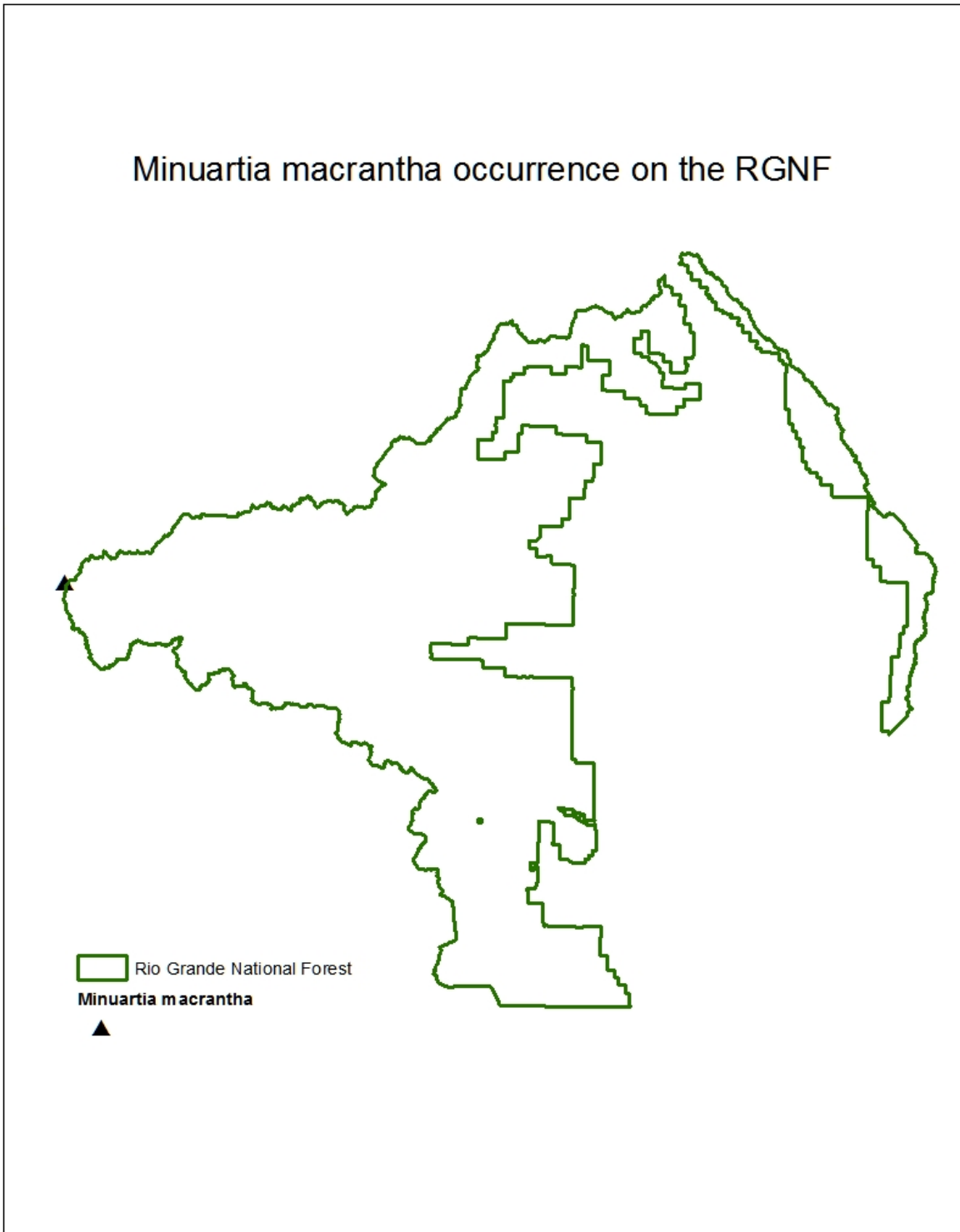


Figure 1. *Minuartia macrantha* occurrence on the RGNF.