Species: *Cryptantha cinerea* (Greene) Cronquist var. *pustulosa* (Rydb.) Higgins

Synonyms – *Cryptantha jamesii* Payson var. *pustulosa* (Rydb.) Harrington; *Cryptantha pustulosa* (Rydb.) Payson;
Oreocarya pustulosa Rydb.
Common names - James' cryptantha; catseye; San Juan cryptantha

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

Table 1. Current status of *Cryptantha cinerea* var. *pustulosa*

Entity	Status	Status Definition
NatureServe	G5TNR	G5—Global ranking of secure - Common, widespread, and abundant. Perpetually secure under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals. TNR – denotes that the taxon (variety *pustulosa*) is not yet ranked
Colorado Natural Heritage Program (CNHP)	S1	S1- State ranking of critically imperiled - because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation or extinction. Typically 5 or fewer occurrences or less than 1000 remaining individuals.
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 and NatureServe, *Cryptantha cinerea* var. *pustulosa* (*Oreocarya pustulosa* is listed as a synonym, as indicated above) is known from Utah, Colorado, Arizona and New Mexico (USDA NRCS 2015, NatureServe 2015). The taxon is not ranked in the other three states where it is known to occur (NatureServe 2015).

There are three CNHP element occurrence records of *Cryptantha cinerea* var. *pustulosa* (identified as *Oreocarya pustulosa*) on the edge of the planning area. The report for one of the occurrences that is mapped as on Rio Grande National Forest states that the occurrence is actually on National Park Service (NPS) lands. There are another four element occurrence records within Colorado, on NPS lands (CNHP 2015).

There are no data on population trends for *Cryptantha cinerea* var. *pustulosa*. 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:

Sivinski (1998) states that *Cryptantha cinerea* occurs in most dry habitats from ponderosa pine forest down to grasslands and desert scrub, and that the variety *pustulosa* is entirely restricted to gypsum habitats in New Mexico. The collection labels for specimens from Colorado that are at Rocky Mountain Herbarium (RM Herbarium 2015) describe habitat as "sandy slopes," "pinyon-juniper," and "riparian and pinyon-juniper." The occurrences that are reported from NPS lands are located on vegetated sand dunes and sparsely vegetated sandy soil.

The known occurrences on the RGNF are located in Pinyon on Mountain Slopes and Nonvegetated Areas on Mountain Slopes Land Type Associations (RGNF GIS data).

Brief description of natural history and key ecological functions:

Cryptantha cinerea is a perennial (sometimes biennial) herb with 1 to several stems from a branching, often woody caudex. The variety *pustulosa* has dark green herbage and in nearly glabrous, except in the inflorescence.

The genus *Cryptantha* has complex reproductive strategies, ranging from autogamy to out-crossing reinforced by heterostyly (heterostyly is regularly associated with outbreeding populations). *Cryptantha cinerea* flowers are homostylic. In general, the widely distributed species of the *Cryptantha* genus are heterostyled, while the narrow endemics are homostyled.

Little is currently known about population demographics in *Cryptantha cinerea* var. *pustulosa.* 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 *Cryptantha cinerea* var. *pustulosa* 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, or ineffective

pollination. Because the habitat is described as "most dry habitats" it is unlikely that reduced habitat availability is an issue. 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 are too many unknowns concerning this species to determine ecological conditions for recovery, conservation and viability. The habitats identified for the species are habitats where disturbance is likely, however, we do not know if disturbance has a positive or a negative impact on the species.

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

Because there are so few occurrences of this species in Colorado it is critically important that the known occurrences on the RGNF be maintained. Presently, most threats appear to be at a relatively low and manageable level. As stated above, there are too many unknowns for this species to determine exactly what is needed for its recovery, conservation and viability, but the RGNF should strive to maintain habitat conditions for *Cryptantha cinerea* var. *pustulosa* 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.

Key uncertainties and information needs/gaps:

There are a large number of information gaps and research needs for this species. Re-visiting the known occurrences, estimating current abundance, assessing imminent threats, measuring demographic parameters, studying genetic variability, and determining ecological needs and limitations are of primary importance. 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 occurrences
- Surveying for new populations
- Defining and measuring habitat and 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 low. This is primarily due to the global status ranging from secure for the species and not ranked for the variety (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. Taxonomic concerns –*Cryptantha cinerea* is a variable and complex species. Some argue that var. *pustulosa* should be considered a separate species while others argue that the characteristics used to identify the varieties are not consistent. A thorough review of this species is needed.

    b. Reproductive biology, autecology, and demography - there are many unknowns about this species' life cycle suggesting numerous areas of potential research.

    c. Genetics - an accurate estimate of this species' genetic vulnerability is unknown.

    d. Disturbance - there are unknowns about the role and types of disturbance and their possible effects.

Key literature:

Colorado Natural Heritage Program (CNHP). 2015. Element Occurrence Records for the Rio Grande National Forest. Unpublished data on file at the Supervisor's Office for the Rio Grande National Forest. Monte Vista, Colorado. Data compiled 2/2015.

Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 18+ vols. New York and Oxford.

Higgins, L.C. 1971. A Revision of Cryptantha subgenus Oreocarya. Brigham Young University Biological Series – Volume XIII, Number 4, March 1971.

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: October 1, 2015).

Sivinski, R. C. 1998. The Genus Cryptantha in New Mexico. In The New Mexico Botanist, Issue Number 8, April 23, 1998.

USDA Natural Resource Conservation Service (NRCA). 2015. The PLANTS Database (http://plants.usda.gov, 1 October 2015). National Plant Data Team, Greensboro, NC 27401-4901.

Utah Division of Wildlife Resources. 1998. Inventory of sensitive species and ecosystems in Utah: Endemic and rare plants of Utah: An overview of their distribution and status, 696 pp.

Map of Known Occurrences:

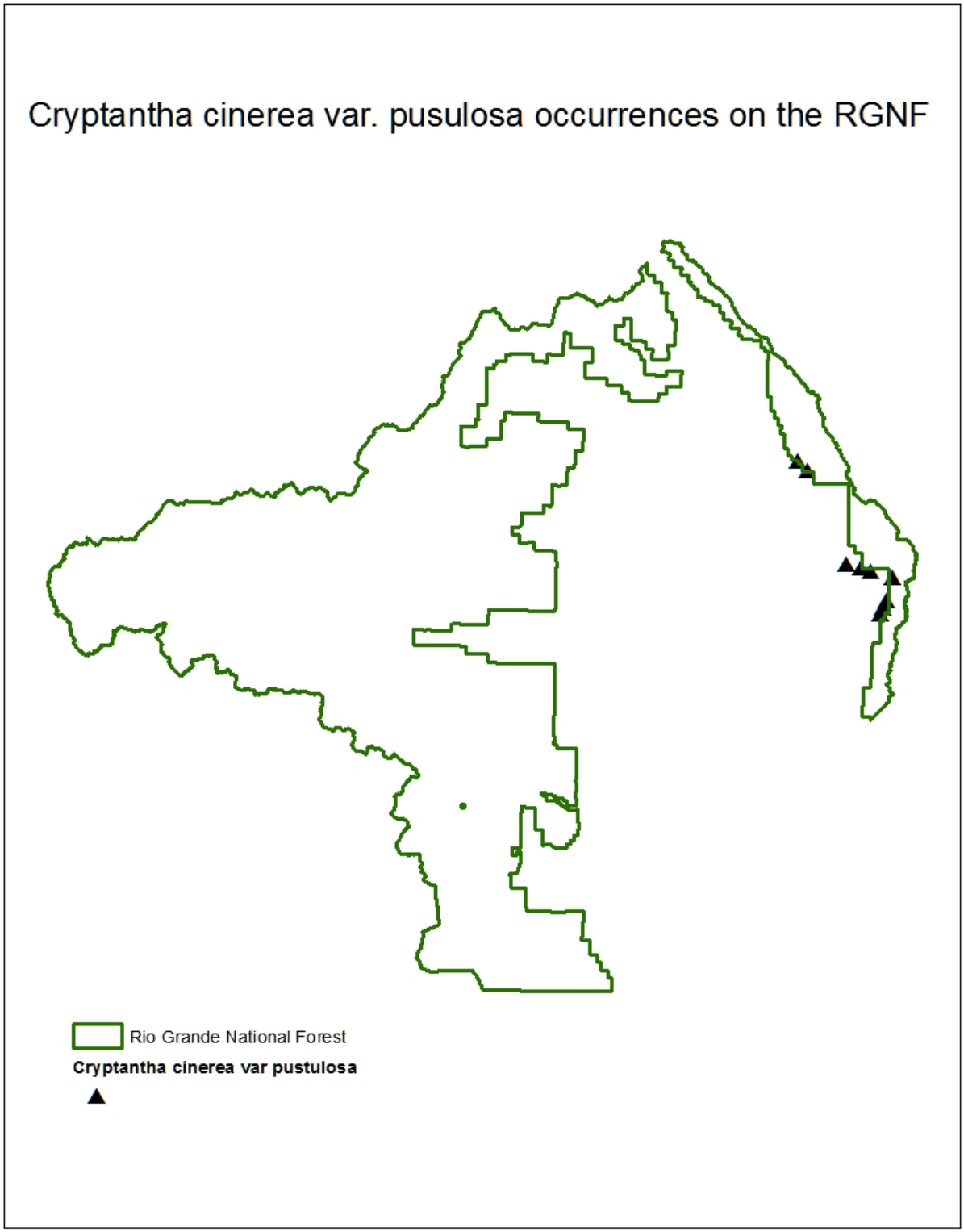

Figure 1. ***Cryptantha cinerea*** **var.** ***pustulosa (Oreocarya pustulosa) occurrences*** **on the RGNF.**