



Recommended Best
Management Practices
for Brandegee wild
buckwheat
(*Eriogonum brandegeei*)



Practices Developed to
Reduce the Impacts of
Road Maintenance Activities
to Plants of Concern



CNHP's mission is to preserve the natural diversity of life by contributing the essential scientific foundation that leads to lasting conservation of Colorado's biological wealth.

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Front Cover: *Eriogonum brandegeei* plants and habitat, from top to bottom,
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Introduction

Brandegee wild buckwheat (*Eriogonum brandegeei*) is a mat-forming plant in the Polygonaceae (Buckwheat Family) that is known only from the Arkansas Valley in Fremont and Chaffee counties, Colorado, and is considered to be imperiled at a global and state level (G1G2/S1S2; Colorado Natural Heritage Program 2014). One of the biggest conservation issues for this imperiled plant species is the lack of awareness of its existence and status. Avoiding or minimizing impacts to this species during road maintenance activities will effectively help to conserve its habitat and is unlikely to confer substantial impacts on road maintenance goals and projects. The Best Management Practices (BMPs) included in this document are intended to help increase the awareness of this species for anyone involved in road maintenance activities.

The desired outcome of these recommended BMPs is to reduce significantly the impacts of road maintenance activities to the Brandegee wild buckwheat on federal, state, and/or private land. The BMPs listed here are intended to be iterative, and to evolve over time as additional information about the Brandegee wild buckwheat becomes available, or as road maintenance technologies develop.

The intent of these BMPs is to inform people working along roadside areas regarding the importance of Brandegee wild buckwheat, one of Colorado's botanical treasures, and to outline some of the ways in which this species can coexist with road maintenance activities. The implementation of these recommendations will help to assure that maintenance activities proceed without unintended harm to these globally imperiled plants.

Best Management Practices for Brandegee Wild Buckwheat (*Eriogonum brandegeei*)

1. Gather mapped location information for Brandegee wild buckwheat along roadsides (within 50 meters/54 yards of all roads: CDOT, County, USFS, BLM, and municipalities) consulting with the Colorado Natural Heritage Program (CNHP) at Colorado State University, local herbaria, and other known sources of rare plant location data. In 2014 this step was conducted by the Colorado Natural Heritage Program as part of a pilot project to conserve roadside populations of globally imperiled plants (Panjabi and Smith 2014).
 2. Work with the Colorado Natural Heritage Program to create Special Management Areas based on the distribution of Brandegee wild buckwheat within 50 meters/54 yards of roads and a recommended avoidance buffer of 200 meters/218 yards. The 200 meter/218 yard buffer reduces dust transport, weed invasion, herbicide damage, magnesium chloride damage, and other unintended impacts, such as alteration of hydrological setting. It also reduces impact to pollinators and their habitat. Special Management Areas (maps and data tables) are presented in Appendix One if a data sharing agreement has been signed with the Colorado Natural Heritage Program.
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3. Prior to road maintenance work, the field supervisor (CDOT) or land manager (County, BLM, etc.) should provide maps to road crews showing all known Special Management Areas for the plants (as hard-copy and GIS files, and including the UTM coordinates indicating the extent of the Special Management Areas along roads). The maps and other data should be “species blind”; they should *not* indicate what species are found within the Special Management Areas (Brandegees wild buckwheat as well as other rare taxa). The maps should be updated as new plant locations are found.
 4. Within the Special Management Areas the roadsides should not be seeded, sprayed or mowed to avoid disturbance to soils, plants, and habitat. This includes all brush control, fire control, and weed control. Dust abatement applications, if necessary, should be comprised of water only, with minimal use of magnesium chloride.
 5. If mowing is necessary, for example for safety reasons, avoid mowing from May 1-August 31. Mowing with a 12 in/30 cm or higher cut could take place in the Special Management Areas before May 1 (or after August 31) as long as the mowers do not drive over/park on top of the plants.
 6. If grading is necessary, following rain or other events that wash out roads, avoid burying the rare plants.
 7. Snow and ice control measures present some concerns for the Special Management Areas, though public safety is a priority. When possible, plowing, deicer and sand applications, rock slide removal, snow fence maintenance and construction activities should consider the locations of the Special Management Areas. For example, sand applications could cover plants when the snow melts and should be avoided if possible.
 8. Locating signs away from Special Management Areas would benefit the Brandegees wild buckwheat. If guardrails need to be installed/repared, minimize impacts to the buckwheat to the greatest extent possible.
 9. *Ex-situ* techniques such as transplanting are not recommended under any circumstances.
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10. Develop monitoring plans for the roadside locations of Brandegee wild buckwheat, with goals to detect any decrease in the population size or condition, and/or needs for restoration efforts and/or noxious weed management.
11. Minimize impacts to habitat for Brandegee wild buckwheat through appropriate and creative project planning. Some examples of appropriate and creative project planning include:
 - Wash vehicles and other equipment to reduce the spread of noxious weeds from other areas.
 - Assure that straw and hay bales used for erosion control are certified free of noxious weeds.
 - Contact the Colorado Natural Heritage Program at Colorado State University when planning ground breaking activities at or near (within 200 meters/218 yards of) Brandegee wild buckwheat sites.

Noxious Weed Management in Habitat for Brandegee Wild Buckwheat (*Eriogonum brandegeei*)

1. Document, map, monitor and control all infestations of noxious weeds (Colorado Noxious Weed Act 2003) and other non-native invasive plant species in and adjacent to occupied habitat for Brandegee wild buckwheat. The Colorado Noxious Weed List can be found online at: <http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1174084048733>
 2. Monitor Special Management Areas for new weed infestations. Noxious weeds in close proximity (within 400–800 meters/437-875 yards) to the plants of concern should be the highest priority for control. Ensure that the rare plants are protected from any damage resulting from weed control efforts.
 3. Control noxious weeds using integrated techniques. Limit chemical control in areas within 200 meters/218 yards of rare plant species to avoid damage to non-target species. Mechanical or chemical control in and near rare plant habitat should only be implemented by personnel familiar with the rare plants.
 4. Herbicide application should be kept at least 200 meters/218 yards from known plant populations, except in instances where weed populations threaten habitat integrity or plant populations. Great care should be used to avoid pesticide drift in those cases.
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Other Needs and Recommended Guidelines

Further inventory, monitoring, research, and conservation planning is recommended for the Brandegee wild buckwheat to assist with future development and implementation of these Best Management Practices (BMPs), as well as our basic understanding of this rare species. As we work to manage for the long-term viability of the Brandegee wild buckwheat it will be important to conduct botanical surveys (inventories) and map new locations to improve our understanding about how roadside locations contribute to full species distribution. Inventory work may also help to identify sites that could be suitable for conservation efforts. Monitoring roadside locations is important to determine if the BMPs are working, and clarify the conservation status of the species. Research into pollination ecology, recommended setbacks, and phenology is also suggested. As these research efforts are undertaken, the following recommendations can help assure high quality results that will be most useful in conservation planning activities.

1. Botanical field surveys should be conducted by qualified individual(s) with botanical expertise, according to commonly accepted survey protocols, and using suitable GPS equipment. The Colorado Natural Heritage Program (CNHP) at Colorado State University can provide references, field forms, etc. Surveys should be repeated at least once every 10 years. Prioritize surveys on preferred geologic substrates within species range.
 2. Botanical field surveys should be conducted during June-August when the Brandegee wild buckwheat can be detected and accurately identified. In some cases multi-year surveys may be necessary, e.g., if drought conditions occur during the survey window.
 3. If Brandegee wild buckwheat (or other species of concern) are found within the survey area, the botanist should endeavor to determine the complete extent of the occurrence and the approximate number of individuals within the occurrence. Ideally occurrences should be delineated by GPS and the results imported to GIS for inclusion on updated project maps.
 4. Field survey results should be reported to CNHP, and to appropriate land managers. A photograph or voucher specimen (if sufficient individuals are present) should be taken. Vouchers should be deposited in one of Colorado's major herbaria (e.g., University of Colorado, Colorado State University, Denver Botanic Gardens). Negative results of surveys should also be reported to CNHP.
 5. Perform frequent and timely inspections of development sites and plants of concern occurrences to ensure that BMPs are being followed, and to identify areas of potential conflict. Inspections of plant occurrences should be performed by a botanist or other qualified personnel.
 6. Monitoring is more likely to succeed if properly planned. Collection of baseline data, prior to any impact, is vital. Although land management agencies may have specific monitoring
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guidelines, an excellent reference for developing and implementing a monitoring plan is Elzinga et al. (1997).

7. Monitor impacts on plants of concern from road maintenance or other activities in the area. If impacts are noted, change management to address the cause of impacts.
8. Develop and implement monitoring plans for noxious weeds. Plans should be designed to detect new infestations and document the extent and spread of existing weeds.

Species profile

Eriogonum brandegeei (Brandege wild buckwheat)

Polygonaceae (buckwheat family)



Close up of *Eriogonum brandegeei* by Susan Spackman Panjabi



Close up of *Eriogonum brandegeei* by Michelle DePrenger-Levin

Ranks and Status

Global rank: G1G2

State rank: S1S2

Federal protection status: USFS Sensitive, BLM Sensitive

State protection status: None

Description and Phenology

General description: *Eriogonum brandegeei* is a mat-forming perennial herb. It is typically 10-25 cm/4-10 in tall, and mats have been observed from 1 in/2.5 cm in diameter to more than 2 ft/61 cm in diameter. *Eriogonum brandegeei* has a deep, woody taproot that, along with its spreading habit, leaves it well adapted to surviving on steep, unstable slopes. Plants have been observed on "pedestals," with much of their woody root exposed. Its leaves are erect and densely hairy on both sides. The dense hair gives the plant a blue-green appearance. *Eriogonum brandegeei* produces leafless, unbranched flowering stalks that bear terminal clusters of white to pink or rose-colored flowers that are 3-3.5 mm/0.12-0.14 in long. The stamens are slightly exerted from the flower (Anderson 2006).

Look Alikes: *Eriogonum brandegeei* is distinguished from other local *Eriogonum* species by its leaves, which are densely tomentose on both sides, and by its unbranched flowering stalk (Spackman et al. 1997).

Phenology: Flowering may occur any time from late June through August, and fruits mature in August or September (Anderson 2006).

Habitat



Habitat of *Eriogonum brandegeei* by Michelle DePrenger-Levin



Habitat of *Eriogonum brandegeei* by Michelle DePrenger-Levin

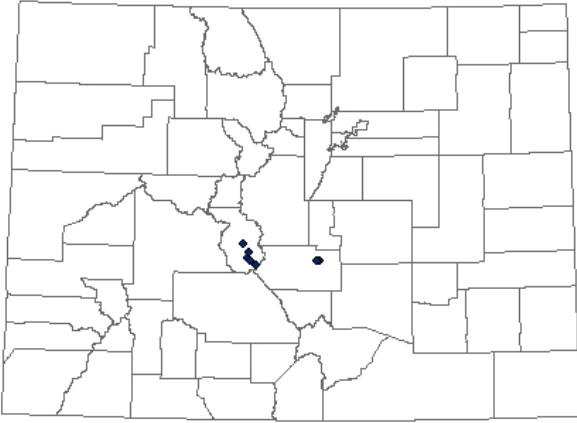
Occurrences of *Eriogonum brandegeei* are limited mostly to outcrops of the Dry Union Formation (in Chaffee County) and lower members of the Morrison Formation (in Fremont County), or to Quaternary strata that are derived from these formations (O'Kane 1988, Spackman et al. 1997, Anderson 2006). The unifying feature of all the known occurrences is the presence of a significant fraction of bentonite clay in the soil (Anderson 2006). Bentonite is derived from the decomposition of volcanic ash, and is a type of shrink-swell, or 2:1 clay. *Eriogonum brandegeei* is most commonly found on active slopes that can be as steep as 90 percent. It has also been documented on flat sites, particularly where erosion has deposited clay soil in small basins (Anderson 2006). In general, this species is found on barren outcrops of white to grayish soils within open sagebrush and pinyon-juniper communities. Frequently associated species include: *Atriplex canescens*, *Opuntia imbricata*, *Bouteloua gracilis*, *Oryzopsis hymenoides*, *Aristida fendleriana*, *Sphaeralcea coccinea*, *Cleome serrulata*, *Melilotus alba*, *Salsola iberica*, *Kochia iranica*, *Melilotus officinale*, and *Bouteloua curtipendula* (Johnston et al. 1981).

Elevation Range: 5,715 - 8,648 feet; 1,742 - 2,636 meters

Distribution

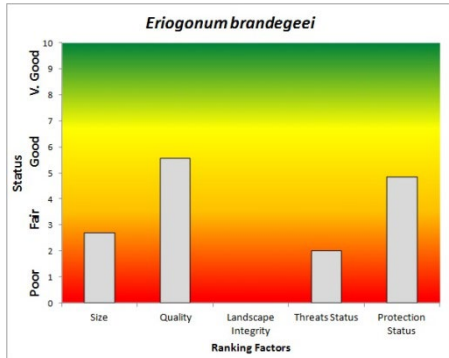
Colorado endemic: Yes

Global range: Endemic to Colorado; Fremont and Chaffee counties. Six of the nine verified occurrences are located within a 5 by 15 mile area along the Arkansas River in Chaffee County. The other three are about 50 miles away in a 2 by 3 mile area at Garden Park, north of Canon City in Fremont County (Anderson 2006). Questionable reports of *E. brandegeei* in other areas are considered to be mislabeled (Anderson 2006). Estimated range is 6,828 square kilometers (2,636 square miles), calculated in GIS by drawing a minimum convex polygon around the known occurrences (calculated by the Colorado Natural Heritage Program in 2008).



Distribution map of *Eriogonum brandegeei* in Colorado.

H3 Threats and Management Issues



Summary results of an analysis of the status of *Eriogonum brandegeei* based on several ranking factors. This species was concluded to be “weakly conserved”. From Rondeau et al. 2011.

The primary threat at this time is considered to be off road vehicle use (Anderson 2006, Rondeau et al. 2011). The species is also threatened by other recreational uses, residential and commercial development (especially near Salida), timber thinning and extraction, mining, right-of-way management, exotic species invasion, grazing, effects of small population size, rust, fire, global climate change, weed spraying and pollution (Anderson 2006). Some threats are more urgent at some sites than at others; however, all sites are threatened by recreational impacts, particularly off road vehicle use. Residential development has encroached on one of the best occurrences. All of the known occurrences are now threatened by human activities (Anderson 2006). According to the CSU Extension Service, a rust species found on some plants in the Cleora site is not a threat as it rarely causes damage to plants (Grant and DePrenger-Levin 2005, Colorado Natural Heritage Program 2005).

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