



Recommended Best
Management Practices
for Grand Mesa penstemon
(*Penstemon mensarum*)

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: *Penstemon mensarum* plants and habitat, from top to bottom,

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Introduction

Grand Mesa penstemon (*Penstemon mensarum*) is a tall, dark-blue-flowered plant in the Scrophulariaceae (Figwort Family) that is known only from the vicinity of Grand Mesa in Gunnison, Delta, Mesa, and Pitkin counties, Colorado. This distinctive species is not known from anywhere else in the world, and is considered to be imperiled at a global and state level (G2/S2; 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 Grand Mesa penstemon 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 Grand Mesa penstemon 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 Grand Mesa penstemon, 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 the Grand Mesa penstemon.

Best Management Practices For Grand Mesa Penstemon (*Penstemon Mensarum*)

1. Gather mapped location information for Grand Mesa penstemon 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 Grand Mesa penstemon 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 or disturbance of hydrological setting. It also reduces impact to pollinators and their habitat. **Special Management Areas**
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(maps and data tables) are presented in Appendix One if a data sharing agreement has been signed with the Colorado Natural Heritage Program.

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 UTMs 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 (Grand Mesa penstemon 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 use of magnesium chloride to the minimum extent necessary.
 5. If mowing is necessary, for example for safety reasons, avoid mowing from May 1-September 30. Mowing with a 12 inch/0.3 meter or higher cut could take place in the Special Management Areas before May 1 (or after September 30) 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 Grand Mesa penstemon. If guardrails need to be installed/repared, minimize impacts to the penstemon 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 Grand Mesa penstemon, 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 Grand Mesa penstemon 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 within 200 meters/218 yards of Grand Mesa penstemon sites.

Noxious Weed Management in Habitat for Grand Mesa Penstemon (*Penstemon mensarum*)

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 Grand Mesa penstemon. 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 Grand Mesa penstemon 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 Grand Mesa penstemon 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 and July when the Grand Mesa penstemon 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 Grand Mesa penstemon (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.
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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 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.
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Species profile

Penstemon mensarum (Grand Mesa penstemon)

Scrophulariaceae (Figwort Family)



Close up of *Penstemon mensarum* by Bernadette Kuhn



Close up of *Penstemon mensarum* by Peggy Lyon.

Taxonomic Comments

Many authors now place this genus in the Plantaginaceae, the Plantain Family (e.g., Ackerfeld 2012).

Ranks and Status

Global rank: G2

State rank: S2

Federal protection status: None

State protection status: None

Description and Phenology

General description: Plants 4-10 dm/16-40 in tall, with one to few, erect stems, glabrous up to the glandular inflorescence. Leaves are entire, glabrous. Basal leaves are long, elliptic. Cauline leaves are sessile and oblanceolate. Inflorescence is elongate, slender. Calyx is glandular pubescent, 3-5 mm/0.1-0.2 in long. Corolla is dark blue or blue tinged with purple, 14-20 mm/0.5-0.8 in long, glandular-pubescent externally, glabrous within. Staminate is included within the corolla throat, and is bearded most of its length. Anther sacs are short-hairy on the side opposite dehiscence (Harrington 1954; Ackerfeld 2012).

Look Alikes: Similar to *P. strictus* although the corollas are shorter. It is also similar to *P. alpinus*. The lobes are intermediate between those of *P. strictus* and *P. alpinus*, the calyx is covered with a glandular puberulence that extends in a lesser degree to the corolla itself.

Phenology: Flowers in late June through July, and sets fruit in early August (Colorado Natural Heritage Program 2012).

Habitat



Habitat of *Penstemon mensarum* by Bernadette Kuhn

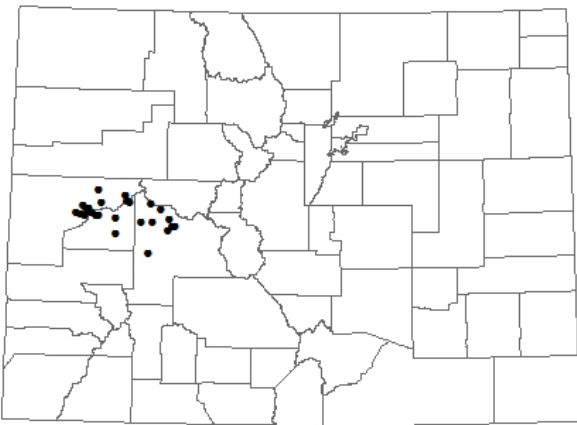
Occurs among oaks, aspens, sagebrush, and in meadows; and thrives in disturbed areas along roads and trails (Harrington 1954, Darrow 2006). Often found in deep clayey loam soils. Associated species include: *Rosa woodsii*, *Cirsium scariosum*, *Helianthella quinquenervis*, *Lupinus argenteus*, *Festuca thurberi*, *Ipomopsis aggregata*, *Geranium viscosissimum*, *Castilleja linariifolia*, *Geranium richardsonii*, *Padus virginiana*, *Rubus parviflora*, *Symphoricarpos rotundifolius*, *Potentilla pulcherrima*, and *Phacelia sericea*.

Elevation Range: 6,670 - 12,218 feet; 2,033 - 3,724 meters

Distribution

Colorado endemic: Yes

Global range: Endemic to Colorado (Delta, Gunnison, Mesa, and Pitkin counties).



Distribution map of *Penstemon mensarum* in Colorado.

Threats and Management Issues

Roads seem to be the primary concern for this species but most records do not report threats.

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