RECOMMENDED BEST MANAGEMENT PRACTICES for Bell's twinpod (*Physaria bellii*)

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: *Physaria bellii* plants and habitat, from top to bottom,

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INTRODUCTION

Bell's twinpod (*Physaria bellii*) is a small, yellow-flowered plant in the Brassicaceae (Mustard Family) that is known only from the Front Range in Boulder and Larimer counties, Colorado, and is considered to be imperiled at a global and state level (G2G3/S2S3; 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 Bell's twinpod 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 Bell's twinpod 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 Bell's twinpod, 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 Bell's twinpod.

BEST MANAGEMENT PRACTICES FOR BELL'S TWINPOD (*PHYSARIA BELLII*)

1. Gather mapped location information for Bell's twinpod 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 Bell's twinpod 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** (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 (Bell's twinpod 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 April 1-August 31. Mowing with a 6 in/15 cm or higher cut could take place in the Special Management Areas before April 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. Any revegetation of roadside activities should include a very low rate of select natives – *Achnatherum hymenoides, Heterostipa neomexicana, Eriogonum brevicaule* and other native cohorts which would require hand collection or no seeding at all within those areas. Seed mixes should not contain any non-native species, or even aggressive native species such as Western Wheatgrass.

8. 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.

9. Locating signs away from Special Management Areas would benefit the Bell's twinpod. If guardrails need to be installed/repaired, minimize impacts to the twinpod to the greatest extent possible.

10. *Ex-situ* techniques such as transplanting are not recommended under any circumstances.

11. Develop monitoring plans for the roadside locations of Bell's twinpod, with goals to detect any decrease in the population size or condition, and/or needs for restoration efforts and/or noxious weed management.

12. Minimize impacts to habitat for Bell's twinpod 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) Bell's twinpod sites.

NOXIOUS WEED MANAGEMENT IN HABITAT FOR BELL'S TWINPOD (*PHYSARIA BELLII*)

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 Bell's twinpod (including non-native pasture grasses). 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. Smooth brome control could be accomplished by licensed individuals familiar with the species using an herbicide selected for monocots only.

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.

OTHER NEEDS AND RECOMMENDED GUIDELINES

Further inventory, monitoring, research, and conservation planning is recommended for the Bell's twinpod 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 Bell's twinpod 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 Bell's twinpod 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 Bell's twinpod (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 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

Physaria bellii
(Bell's twinpod)

Brassicaceae (Mustard Family)

Close up of *Physaria bellii* by Pam Smith

Close up of *Physaria bellii* by Georgia Doyle

Close up of *Physaria bellii* by Steve O'Kane

Ranks and Status

Global rank: G2G3
State rank: S2S3
Federal protection status: None
State protection status: None

Description and Phenology

Physaria bellii by Constance Sayas

General description: Perennials with dense racemes of yellow flowers and basal leaves that form a strong rosette. Plants rise from a simple caudex that is densely (silvery) pubescent. The stems are simple from the base of the plants, decumbent to nearly prostrate, and 0.5-1.3 dm/2-5 in long. Basal leaf blades are broadly obovate, with shallowly dentate margins. Cauline leaves are oblanceolate to broadly obovate, 1-2.5 cm/0.4-1 in, with entire margins. Fruits are arranged in pairs (hence the common name twinpod). The fruit pods are slightly flattened (contrary to replum) to uncompressed, 4-9 + 2-8 mm/0.16-0.35 + 0.07-0.31 in, and the apical and basal sinuses are narrow and deep.
Look Alikes: *Physaria vitulifora* has larger, fiddle shaped leaves, and the constriction separating the locules of the fruit is much deeper above than below.

Phenology: Flowers April through June, fruits July and August (Colorado Natural Heritage Program 2012).

Habitat

Habitat of *Physaria bellii* by Pam Smith

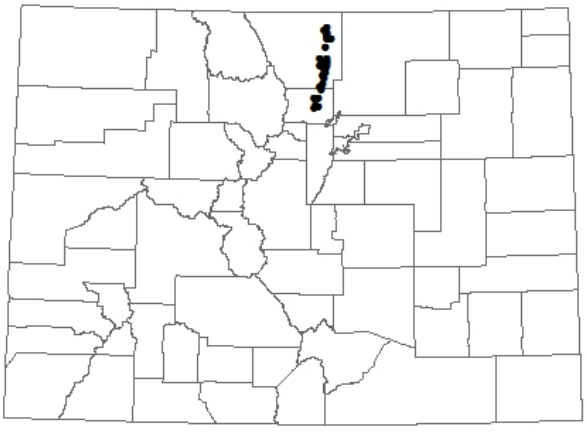
Physaria bellii is found along the Front Range foothills often in shale and limestone soils of the Fountain/Ingleside, Lykins, Niobrara, and Pierre formations. This species is found in association with grassland and shrubland habitats, in rocky areas and road cuts. Commonly associated taxa include: *Cercocarpus montanus, Oryzopsis hymenoides, Guiterrezia sarothrae, Rhus trilobata, Lesquerella ludoviciana, Heterostipa neomexicana. Penstemon secundiflorus, Eriogonum brevicaule, Opuntia, Dalea,Yucca, Sphaeralcea*, and *Heterotheca* (Flora of North America 1993+, Colorado Natural Heritage Program 2013).

Elevation Range: 5,089 - 6,552 feet; 1,551 - 1,997 meters

Distribution

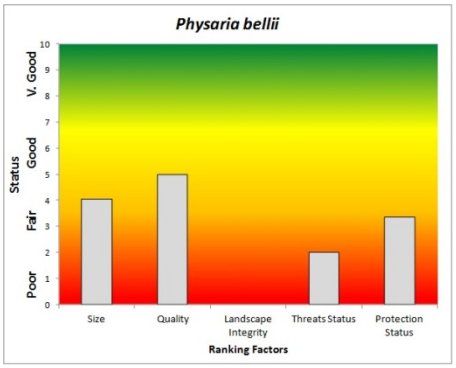
Colorado endemic: Yes

Global range: Endemic to Colorado; known from Boulder and Larimer counties.



Distribution map of *Physaria bellii* in Colorado

Threats and Management Issues



Summary results of an analysis of the status of *Physaria bellii* based on several ranking factors. This species was concluded to be "weakly conserved". From Rondeau et al. 2011.

The primary threat is from residential development along the Front Range of Colorado. Additional potential threats are limestone mining operations, and road construction and maintenance. Invasion of habitat by noxious weeds such as Mediterranean sage, Myrtle spurge, cheatgrass, smooth brome, and diffuse knapweed, may also be a threat to some occurrences. Many occurrences have been destroyed or degraded by limestone mining and housing subdivisions, however, many large and high quality occurrences are still viable.

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