

FIELD SURVEY FOR CRYPTANTHA SUBCAPITATA,
PHYSARIA EBURNIFLORA, AND SPHAEROMERIA SIMPLEX
ON BLM LANDS IN CENTRAL WYOMING

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Casper District, by

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INTRODUCTION

The Bureau of Land Management (BLM) is responsible for balanced management of natural resources, including plant and animal species, on public lands. The Endangered Species Act and BLM Manual 6840 direct the BLM to conserve federally listed Threatened and Endangered species and the ecosystems upon which they depend. In addition, Manual 6840 requires the BLM to manage species identified by the US Fish and Wildlife Service (USFWS) as candidates for listing in such a manner that these species and their habitats are conserved and to ensure that agency actions do not contribute to the need to list these species as Threatened or Endangered (Willoughby et al. 1992).

Cryptantha subcapitata (Owl Creek miner's candle), Physaria eburniflora (Devil's Gate twinpod), and Sphaeromeria simplex (Laramie false sagebrush) are currently designated as USFWS Category 2 (C2) candidates for listing¹ (US Fish and Wildlife Service 1993; Fertig 1993a). These three taxa are presently known to occur within, or adjacent to, lands managed by the BLM Casper District in central Wyoming. Each has been recommended for sensitive designation in the Casper District's Platte River Resource Area (Neighbours and Marriott 1991).

In 1993, the Casper District contracted on a cost-share basis with The Nature Conservancy's Wyoming Natural Diversity Database (WYNDD) to conduct field surveys for these three species on BLM lands in the District (Figure 1). The objectives of this project were to collect information on the biology, distribution, habitat use, population size, and potential threats for each species and to determine their conservation status and management needs in the District.

METHODS

Information on habitat and distribution of the three candidate species was obtained from secondary sources, including WYNDD files and computer databases, collections of the Rocky Mountain Herbarium (RM), the literature, and knowledgeable individuals. USGS topographic maps, geologic maps (Love and Christiansen 1985) and BLM land status maps were used to identify areas of potential habitat for ground survey.

Field surveys were conducted by the author from late May through mid July, 1993 (survey routes and collection sites are indicated in Appendix B). Data on biology, habitat, population size, and

¹ Category 2 taxa are those in which there is some evidence of vulnerability to extinction, but for which there are not enough data to support a listing proposal at this time; additional biological research and field survey is needed to

determine if listing is necessary (Fertig 1993a).

Figure 1. Study area in Central Wyoming

management needs were collected using WYNDD plant survey forms (Appendix C). Locations of candidate species were mapped on 7.5' USGS topographic maps. If populations were sufficiently large, voucher specimens were collected for deposit at the RM. Information gathered in the field was entered into the computerized Element Occurrence database of the WYNDD.

RESULTS

Prior to 1993, Cryptantha subcapitata had not been documented from the BLM Casper District, but was suspected to occur there based on the proximity of a known population in the Cedar Ridge area in northeast Fremont County (Rawlins District). Surveys on BLM lands in the southern Bighorn Mountains in northwestern Natrona County, however, failed to result in the discovery of any new populations on Casper District lands. Four populations of caespitose cat's-eye (C. caespitosa), a closely related and morphologically similar species, were located at 4 sites in the district. This species is a regional endemic of central and southern Wyoming, northeastern Utah, and southeastern Idaho and is tracked as a species of special concern by WYNDD (Fertig 1993a, 1993b). Caespitose cats'-eye occurs in similar habitats as C. subcapitata and is distinguished on the basis of subtle, but consistent fruit characteristics. C. caespitosa is moderately common, but due to its restricted global distribution, it is potentially vulnerable to extinction (Fertig 1993b).

In 1993, two populations of Physaria eburniflora were located in the Platte River Resource Area along the east rim of Bates Hole.

Six additional populations were found in the Granite Mountains and Muddy Gap area in southwestern Natrona County and northern Carbon County, all on lands managed by the BLM Rawlins District.

Large areas of potentially suitable habitat were surveyed in the Rattlesnake Mountains, Casper/Muddy Mountain area, North Platte River valley, and Bates Hole, but no additional populations of P. eburniflora were found. All of the twinpod specimens encountered in these areas belonged to two related species, Physaria acutifolia and P. brassicoides.

A reported occurrence of P. eburniflora from the southeastern Bighorns could not be relocated in 1993. This record is based on a depauperate specimen at the RM, annotated by Rollins as "P. eburniflora (?)". Based on the material available, this specimen cannot be readily distinguished from P. acutifolia. Only P. acutifolia was observed at the reported location in 1993.

Sphaeromeria simplex had been reported for Natrona, Converse, and Carbon Counties by Dorn (1992), but exact locations were not published, nor were specimens deposited in the RM. Searches of suitable habitat in the Rattlesnake Mountains, northern Laramie

Range, and Casper/Muddy Mountain area failed to locate populations of this species from BLM lands on the Casper District. In 1993 a large population, first discovered by Dorn in 1984, was relocated in the Shirley Mountains (Carbon County) on lands managed by the Rawlins District. Potential habitat on private lands in the Casper District was not surveyed extensively.

SPECIES SUMMARIES

Information on the biology and conservation status of Cryptantha subcapitata, Physaria eburniflora, and Sphaeromeria simplex is presented in the following section. Distribution maps and location data are also provided in the accompanying tables and figures. Element occurrence records (formatted database reports) with population maps are contained in Appendix A. A key to fields in these printouts is also included. These printouts contain the most detailed and current, population-specific information available.

Cryptantha subcapitata Dorn & Lichvar
OWL CREEK MINER'S CANDLE
Boraginaceae (Borage family)

Federal Status: USFWS: C2 (US Fish and Wildlife Service 1993)

Heritage Rank: Wyoming: G1/S1

Description: (Figure 2) Owl Creek miner's candle is a mat-forming perennial herb averaging less than 15 cm high. The leaves are linear to linear-oblongate, 1-3 mm wide, and densely pubescent with both appressed, short hairs and longer, spreading, bulbous-based hairs. The inflorescence is head-like, with white flowers 5-6 mm broad that barely exceed the calyx tube. The nutlets (individual segments of the 4-parted fruits) are wrinkled and bumpy on the back and are enclosed by the pubescent calyx lobes. The slender style persists in fruit and exceeds the nutlets by 1.5-2 mm (Dorn and Lichvar 1981; Dorn 1989).

Similar Species: Caespitose cat's-eye (Cryptantha caespitosa) has an elongate inflorescence and styles that exceed the nutlets by less than 0.5 mm. Bristly cat's-eye (C. spiculifera) also has a more elongate inflorescence and closed scars on the underside of the nutlet (the nutlet scar is a remnant of the common point of attachment of the four nutlets and is open in C. subcapitata and C. caespitosa) (Dorn and Lichvar 1981). C. flavoculata has a head-like inflorescence, but can be distinguished by its larger flowers, with the corolla tube readily exceeding the calyx in length. Other species of Cryptantha differ in being annual, having smooth nutlets, or having erect (non-matted) stems (Dorn 1992).

Flowering/Fruiting Period: Flowers late May-June, mature fruits present mid June-mid July (Dorn 1989). Mature fruit are essential for positive identification of this species. To find mature fruit, look for flowers at the base of the inflorescence that lack petals and have a swollen calyx.

Habitat: Sandy-gravelly slopes and desert ridges in sparsely vegetated cushion plant communities. It appears to be restricted to sandstones derived from the Eocene Wind River Formation. Elevation 4700-6000 feet (Dorn 1989).

Distribution: Endemic to the Owl Creek and Bridger Mountains and adjacent Wind River Basin in northern Fremont County, Wyoming.

Land Ownership/Management: Boysen State Park, Rawlins District BLM, Wind River Indian Reservation.

Occurrences on the Casper District: No occurrences of this species were found on lands managed by the Casper BLM in 1993. Surveys were concentrated on potential habitat in the southeastern Bighorn Mountains in extreme northwestern Natrona County (Platte River RA). This area is approximately 20 air miles east of known occurrences in the Cedar Ridge area of the Bridger Mountains. The only *Cryptantha* species to be located here were *C. flavoculata* and *C. caespitosa*. Habitat was also surveyed in the Badwater and Alcova areas, Rattlesnake Mountains, Casper/Muddy Mountain, and Bates Hole, but no populations of *C. subcapitata* were located.

Population Size: Dorn (1989) estimated a total population of 38,000 individuals from two of the three known populations in Fremont County. The plants appear to be locally abundant where they occur. No plants are presently known from lands managed by the Casper District.

Existing and Potential Threats: Known populations of this species are currently stable and vigorous and have no immediate significant threats. Special management is recommended to ensure that these trends continue (Dorn 1989). Due to its limited distribution, this species is at high risk to surface development activities on its habitat.

Additional Comments: Owl Creek miner's candle was described as a new species to science by Robert Dorn and Robert Lichvar in 1981. A population assigned to this species from the Wind River Indian Reservation may belong to a new, as yet undescribed, species (Dorn 1989).

Figure 2. Line drawing of Cryptantha subcapitata from Dorn and Lichvar (1981)

Figure 3. Wyoming distribution map of Cryptantha subcapitata

Physaria eburniflora Roll.
DEVIL'S GATE TWINPOD
Brassicaceae or Cruciferae (Mustard family)

Federal Status: USFWS: Proposed C2 (Fertig 1993)

Heritage Rank: G2/S2

Description: Devil's Gate twinpod is a tufted, silvery-pubescent, perennial herb with prostrate stems less than 8 cm long. The spoon-shaped leaves are entire, round-tipped, 1.5-2.5 cm long, and arranged in a flattened rosette. Flowers are whitish or pale yellow, 9-12 mm long, and borne on prostrate stems 1-5 cm long. The fruits are inflated, two-lobed, less than 1 cm wide, and densely pubescent with shaggy, spreading hairs (these hairs are visible with the naked eye). The membranous partition (replum) between each half of the fruit is obovate and bears four stubby, persistent stalks (funiculi) on each face (Rollins 1981; Lichvar 1982).

Similar Species: Tufted twinpod (Physaria condensata) has appressed pubescence on the fruits, deeper yellow flowers, and more pointed leaves. Common twinpod (P. didymocarpa) has erect fruiting stems that exceed the basal leaves by more than 3 cm and may have toothed leaves. P. acutifolia, the most widespread twinpod species in the study area, differs in having a more erect growth form, longer leaves, and fruits with narrowly linear partitions bearing two funiculi on each face (Lichvar 1982; Dorn 1992).

Flowering/Fruiting Period: Flowers May-June, fruits present June-July. Unlike other species of twinpod, P. eburniflora can be recognized on flower color alone. In the absence of fresh flowers, mature fruit are essential for positive identification.

Habitat: Cushion plant communities with low vegetative cover. Survey work in 1993 demonstrated that this species can occur on three distinct substrates. In the Muddy Gap and Ferris Mountains area, it is typically found on calcareous ridges and slopes.

In the Granite Mountains and at Devil's Gate, it grows in thin deposits of brownish, clay-rich soil with well developed cryptogam crusts, surrounded by granite outcrops. The eastern Bates Hole populations are found on whitish, crumbly sandstone/limestone deposits.

Distribution: Endemic to the Sweetwater and North Platte river basins in central Wyoming (Carbon, Fremont, and Natrona

counties). The range of P. eburniflora is centered in the Muddy Gap/Ferris Mountains area and the Granite Mountains. Peripheral populations are found along Beaver Rim and on the eastern edge of Bates Hole.

Land Ownership/Management: Casper District BLM (Platte River RA); Rawlins BLM (Great Divide RA, Lander RA); state of Wyoming.

Occurrences on the Casper District: Devil's Gate twinpod was located at two sites in the vicinity of Twin Buttes on the east side of Bates Hole in 1993. No plants were found at other seemingly suitable sites along the sandstone ridge on the east side of Wyoming Highway 487 in southern Natrona County. Potential habitat was also surveyed unsuccessfully in the southern Rattlesnake Mountains, Casper/Muddy Mountain area, North Platte River drainage, and Bates Hole. A reported population from the Cedar Ridge area of the southeastern Bighorns was investigated, but could not be relocated. This record, based on a depauperate and tentatively annotated specimen at the RM, may actually be a population of P. acutifolia. A known population from the Benton Basin area, west of Alcova Reservoir, (EOR 014) also could not be relocated. Only P. acutifolia was found at this site in 1993.

Population Size: Populations surveyed in 1993 were found to be locally common, but often widely scattered on pockets of suitable habitat. The largest and most extensive populations were found in the Twin Buttes area and contained several thousand individuals over an area of 40-60 acres. Occurrences in the Granite Mountains and at Muddy Gap generally consisted of small clumps of 14-20 plants scattered over large areas. The clumped nature of these populations may be the result of limited seed dispersal ability or asexual reproduction.

Existing and Potential Threats: The Twin Buttes population is presently unthreatened from most disturbances due to the ruggedness and inaccessibility of its habitat. The nearby population adjacent to the Sand Draw Road is more accessible, but appears to be little impacted by human pressures at this time. Dorn's Benton Basin population, although not relocated in 1993, occurs on habitat that does not appear to be disturbed or threatened. Range-wide, this species is most vulnerable to potential surface disturbance of its limited habitat in association with mineral development. Cattle grazing is not a threat to most habitats, which are generally too barren or rugged to support usable forage. The limited range of this species globally, makes it vulnerable to long term changes in habitat quality and to widespread habitat destruction.

Additional Comments: Devil's Gate twinpod was first discovered

by Robert Dorn in the Muddy Gap area in 1977. At this time, it was believed to be a disjunct population of P. condensata, another Wyoming endemic from the southwestern corner of the state. The Muddy Gap plants were described as a new species to science by Reed Rollins in 1981.

Figure 4. Line drawing of Physaria eburniflora by Robin Jones

Table 1
Location and Demographic Information
for Known Populations of Physaria eburniflora
on the Casper District BLM

Platte River Resource Area (Figure 7)

1. Natrona County: East rim of Bates Hole; SE slopes and summit of Twin Buttes, ca 0.5 mi N of Sand Draw Road, ca 2 air mi E of WY Hwy 487 (T30N R80W Sec 27 S2; Sec 34 NW4NW4). Elev. 6600 ft. 12 July 1993. (WYNDD occurrence # 003).

Habitat: open, cushion plant community with low cover (less than 25%) on white, crumbly limestone-sandstone outcrops and fine-textured scree slopes. With Lomatium nuttallii, Phacelia hastata, Purshia tridentata, Eriogonum brevicaulis. Population size: several thousand individuals observed over area of 40-60 acres. Additional potential habitat continues on upper rim of bench to north. Herbarium specimens: Lichvar 4336 (RM), Fertig 14094 (RM).

2. Natrona County: East rim of Bates Hole; butte adjacent to Sand Draw Road, ca 4 air mi E of WY Hwy 487 (T29N R80W Sec 2 NE4SW4). Elev. 6800 ft. 12 July 1993. (WYNDD occurrence # 018).

Habitat: cushion plant community on limestone/sandstone crumbly gravel and loose sandy slopes of pyramidal butte. With Lomatium nuttallii, Ivesia gordonii, Astragalus kentrophyta. Population size: 800-1000 rosettes estimated on area of 1-2 acres. Herbarium specimen: Fertig 14095 (RM).

3. Natrona County: Sweetwater valley, off WY Hwy 220 near Pathfinder Road (W of Alcova Reservoir) (T30N R83W S19 N2). Elev. 6400 ft. 20 June 1979. (WYNDD occurrence # 014).

Habitat: rocky calcareous outcrop with Phlox muscoides and Hymenoxys. Population size: not known. Herbarium specimen: Dorn 3227 (RM). Not relocated in 1993.

4. Natrona County: Southeastern flank of Bighorn Mountains; Cedar Ridge, ca 13 air mi NNW of Hiland (T38N R88W Sec 5, 6; T39N R88W Sec 31, 32). Elev. 6100-6826 ft. 10 July 1985. (WYNDD occurrence # 015).

Habitat: rocky juniper slopes. Population size: not known. Herbarium Specimen: Haines 4792 (RM) [identified as P. acutifolia, annotated by Reed Rollins as "P. eburniflora (?)" in 1988]. Not relocated in 1993; authenticity questioned (see text).

Figure 7. Casper BLM distribution map of Physaria eburniflora

Figure 8. Wyoming distribution map of Physaria eburniflora

Sphaeromeria simplex (A. Nels.) Heller
LARAMIE FALSE SAGEBRUSH
Asteraceae or Compositae (Sunflower family)

Federal Status: USFWS: C2 (US Fish and Wildlife Service 1993)

Heritage Rank: Wyoming: G1/S1

Description: Laramie false sagebrush is a mat-forming perennial herb or subshrub less than 10 cm tall. The silvery-hairy linear leaves are crowded at the base of the stem and are entire or 2-3 toothed at the tip. Flowering stems have 2-3 small, linear leaves and a single, terminal flower head of numerous, yellow disk flowers (ray flowers are absent). The involucre is composed of 2 sets of green bracts with membranous margins. No pappus is present on the ribbed achenes (Coulter and Nelson 1909; Dorn 1980).

Similar Species: Rock tansy (Sphaeromeria capitata) has a single, large, head-like terminal inflorescence composed of two or more separate, sessile flower heads (these can be recognized by the presence of more than one involucre). Chicken sage (S. argentea) has several distinct, short-stalked heads in a loose inflorescence. Herbaceous and low shrubby species of true sagebrush (Artemisia spp.) have numerous flowering heads arranged in spikes, racemes, or panicles (Dorn 1992). Vegetative and rayless specimens of stemless hymenoxys (Hymenoxys acaulis) differ in having tufts of white hairs at the base of the sessile, entire, basal leaves.

Flowering/Fruiting Period: May-August.

Habitat: Cushion plant communities on rocky limestone ridges and gentle slopes. Substrate barren, thin, sandy-limestone gravel. Elevation 7500-8600 feet (WYNDD records).

Distribution: Endemic to central and southeastern Wyoming. Confirmed populations are known from the western foothills of the Laramie Range on the outskirts of Laramie (Albany Co.) and in the Shirley Mountains (Carbon Co.). Additional populations have been reported from Natrona and Converse Counties (Dorn 1992; personal communication).

Land Ownership/Management: Rawlins District BLM (Great Divide RA) and private.

Occurrences on the Casper District: Potential habitat was

surveyed in the Rattlesnake Mountains, Casper and Muddy Mountains, the northern foothills of the Laramie Range, and in the Alcova area, but no populations of this species could be located during 1993 survey work in the Casper District. Future survey efforts on private lands, especially on Casper Mountain, may still substantiate the presence of this species in Natrona County.

Population Size: Known populations near Laramie and in the Shirley Mountains are locally common, but often scattered on pockets of suitable habitat. Population estimates for the Laramie population range from 2000-186,000 individuals, although this latter figure has been questioned. Several thousand plants were observed at two areas in the Shirley Mountains in 1993.

Existing and Potential Threats: Limestone quarrying is the principle threat to the population near Laramie. A conservation easement between Mountain Cement Company and The Nature Conservancy is currently protecting approximately 20 acres of habitat at this site. The Shirley Mountain population is currently secure, but could also be threatened by surface disturbance associated with quarrying or other mineral development. Overall, the small global range of the species makes it vulnerable to extinction from habitat loss.

Figure 9. Line drawing of Sphaeromeria simplex from Dorn (1980)

Figure 10. Wyoming distribution map of Sphaeromeria simplex

DISCUSSION AND RECOMMENDATIONS

Cryptantha subcapitata was not located on BLM lands in the Casper District in 1993. Although Owl Creek miner's candle is known from a site in the Bridger Mountains approximately 20 miles west of the District boundary, it has not been found on lands managed by the Casper District. It appears to be replaced by the morphologically similar species C. caespitosa on suitable habitats in the southern Bighorn Mountains. Dorn (1989) recommended that C. subcapitata be downlisted by USFWS from C2 to 3C based on lack of threats. This recommendation was not accepted in the latest Notice of Review (US Fish and Wildlife Service 1993). Due to its limited geographic range and high habitat specificity, this species remains vulnerable to large scale habitat disturbance. For these reasons it is an appropriate candidate for Sensitive designation by the state BLM. Further status surveys are not recommended on the Casper District, although the plant should be looked for at potential project sites in the southeast Bighorns where it may have been overlooked.

Devil's Gate twinpod was found at two sites in the Casper District in 1993. Two other known, or reported populations could not be relocated. Extensive areas of potential habitat surveyed in the District were found to lack populations of this species. Adjacent BLM lands on the Rawlins District, however, are known to have large populations. Most known occurrences of Physaria eburniflora are presently unthreatened by human disturbances (including grazing and roads). Future surface disturbance, such as that associated with mineral development, could be detrimental. Because of its limited global range, this species is potentially vulnerable to extinction if habitat losses are excessive. It is recommended that the state BLM designate this species as Sensitive and manage selected habitats to maintain long-term population viability.

Sphaeromeria simplex was not located in the District in 1993, despite thorough survey of extensive areas of suitable, potential habitat. Based on these results, and the known limited distribution of the species, Laramie false sagebrush is a worthy candidate for federal protection and BLM state sensitive designation. Future survey efforts should be directed at private lands in the northern Laramie Range (particularly on Casper Mountain). Clearance work for this species should be conducted on future project sites where suitable potential habitat is found in the Casper District.

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Appendix A
Element Occurrence Records
and
Population Maps
For populations surveyed in 1993

Appendix B
1993 Survey Routes

Appendix C.
Special Plant Survey Form,
WYNDD

Appendix D.

Slides