

CONSERVATION STATUS OF *HAPLOPAPPUS CARTHAMOIDES*
VAR. *SUBSQUARROSUS* IN MONTANA

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I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: *Haplopappus carthamoides* (Hook.) Gray var. *subsquarrosus* (Greene) Dorn
2. SYNONYMS: *Haplopappus carthamoides* (Hook) Gray ssp. *subsquarrosus* (Greene) Hall, *Pyrrocoma subsquarrosa* Greene, *Pyrrocoma carthamoides* Hook. var. *subsquarrosa* (Greene) Brown & Keil
3. COMMON NAME: Absaroka goldenweed
4. BIBLIOGRAPHIC CITATION: Greene, E. L. 1895. *Novitates occidentales*- X. *Erythea* 3: 17-24 (described as *Pyrrocoma subsquarrosa*)
5. TYPE SPECIMENS: United States, Wyoming, Park County, Sunlight Basin, 5 September 1893 Rose 334 (Holotype US, Isotype UC)
6. FAMILY: Asteraceae (Compositae)
7. GENUS: *Haplopappus* (*sensu lato*) contains ca. 150 species, all occurring in North or South America (Cronquist 1994). Other recent treatments (e.g., Brown 1993) place this species in the segregate genus *Pyrrocoma*.
8. SPECIES: *Haplopappus carthamoides* has three varieties: *carthamoides*, *cusickii*, and *subsquarrosus*. Variety *subsquarrosus* was first described as *Pyrrocoma subsquarrosa* by E. L. Greene (Greene 1895) and was subsequently classified as *Haplopappus carthamoides* ssp. *subsquarrosus* by Hall in his monograph of the genus (Hall 1928). Dorn proposed the new combination *Haplopappus carthamoides* var. *subsquarrosus* in his 1988 Wyoming flora (Dorn 1988). Most recently Brown and Keil placed the species in the segregate genus *Pyrrocoma* and

proposed *P. carthamoides* var. *subsquarrosa* (Brown and Keil 1993).

Neither Cronquist (1955) nor Mayes (1976) recognize *H. carthamoides* var. *subsquarrosus* as a distinct taxon. Both believe that it should be combined with var. *carthamoides*. Cronquist notes that a spiny-leaved form of var. *carthamoides* occurs near the east end of the Columbia River Gorge in Oregon and Washington (Cronquist 1955).

B. PRESENT LEGAL OR FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. Fish and Wildlife Service: C-2; *Haplopappus carthamoides* var. *subsquarrosus* was listed as a candidate for listing as an endangered or threatened species, but currently there is not enough information to make a decision on listing (USDI-FWS 1993). A 1995 rule change made by the Director of the U.S. Fish and Wildlife Service has placed all C-2 species on a Species at Risk list and done away with C-2 status.
- b. U.S. Forest Service: No current status in Region One (Custer National Forest). The discovery of *Haplopappus carthamoides* var. *subsquarrosus* in Montana in 1993 is too recent for it to have been included in the most recent revision of the Region One Forest Service sensitive list. However, species listed as C-2 have traditionally been treated as sensitive in Region One.

2. STATE STATUS: *Haplopappus carthamoides* var. *subsquarrosus* is currently listed as imperiled because of rarity both globally and in Montana (G5T2-S2). This state listing does not provide any direct legal protection.

C. DESCRIPTION

1. GENERAL NONTECHNICAL DESCRIPTION: Absaroka goldenweed is a perennial herb with 1-few stems that arise from a simple or branched rootcrown and curve out and then up to a height of up to 3 dm (12 in). The basal leaves, up to 20 cm (8 in) long and 25 mm (1 in) wide, have a slender stalk and a narrowly lance-shaped blade with spiny margins. Stem leaves are mostly sessile and become progressively smaller upward. The foliage is glabrous or nearly so. 1-4 heads are borne at the top of the stem, subtended by small leaves (bracts). Each narrowly hemispheric head has 3-4 series of overlapping, broadly lance-shaped involucre bracts, 10-25 mm high. The outermost bracts have spiny margins. There are numerous light yellow disk flowers, 8-12 mm long, and 8-25 very inconspicuous ray flowers of the same color. The seeds (achenes) are topped by pale brownish bristles as long or longer than the disk corollas. Photographs of *Haplopappus carthamoides* var. *subsquarrosus* are provided in Appendix A.
2. TECHNICAL DESCRIPTION: Plants herbaceous, perennial, 1-2.5 dm tall; stems decumbent, erect or curved ascending, 1-4 arising from the crown of a woody taproot; basal leaves lanceolate or narrowly spatulate, petiolate, acute, 8-20 cm long and 1-2.5 cm wide, tomentulose when young, margins spinulose-serrate; cauline leaves alternate, smaller than the basal, spinulose-serrate; heads bracteate, campanulate, solitary and terminal or 2-4 racemose, short-peduncled or sessile; involucre ca. 17 mm high and 20-25 mm broad; bracts loosely imbricated, tomentulose, the outer foliaceous, narrowly lanceolate and spinulose-margined, the inner oblong and cuspidate from a broad truncate apex, the mucro more-or-less recurved; ray florets 0-25, ligules 2-7 mm long and 1-1.5 mm wide, tube glabrous; disk flowers 25-50, corolla tubular-funnelform, 9-12 mm long, glabrous, style branches 1-1.6 mm long; achenes

subcylindric, 4-angled, 3-5.5 mm long, glabrous; pappus of ca. 35-45 rigid, unequal, tawny to reddish-brown bristles, 6-9.2 mm long (Hall 1928, Mayes 1976).

3. SIMILAR SPECIES AND FIELD CHARACTERS: Spiny-margined leaves and involucre bracts combined with the large heads with inconspicuous rays distinguish this species from other members of the Asteraceae in south-central Montana.

Haplopappus carthamoides var. *carthamoides* is a Columbia Basin plant, occurring from eastern Washington to northwest Montana. It generally has hemispheric heads and lacks spiny-margined involucre bracts; however, Cronquist (1955) reports that plants from the east end of the Columbia River Gorge have leafy, spiny-margined outer involucre bracts. *Haplopappus carthamoides* var. *cusickii* is more of an intermountain species, occurring from southeast Washington, eastern Oregon and central Idaho south to Nevada and California. It has cylindrical heads with narrowly lance-shaped involucre bracts lacking spines.

D. GEOGRAPHIC DISTRIBUTION

1. RANGE: *Haplopappus carthamoides* var. *subsquarrosus* occurs along the east side of the Absaroka Mountains in Park County, Wyoming north to the east front of the Beartooth Mountains in adjacent Carbon County Montana. The range is ca. 50 miles long, mainly between the cities of Cody, Wyoming and Red Lodge, Montana. The range also includes the only two main mountain valleys, the Clark's Fork of the Yellowstone River (Sunlight Basin) in Wyoming and Rock Creek in Montana. The location of known Montana populations are shown in Appendix B.

Haplopappus carthamoides var. *carthamoides* occurs in eastern Washington and north-central Oregon

east to northwest Montana. Variety *cusickii* is found from southeast Washington, eastern Oregon and central Idaho south to Nevada and California.

2. RECENTLY VERIFIED SITES

a. WYOMING: There are 13 documented occurrences of *Haplopappus carthamoides* var. *subsquarrosus* in Wyoming. Many of these were verified or discovered in 1995 during survey studies conducted for Shoshone National Forest. There are ca. 100,000 plants in Wyoming. (W. Fertig, Wyoming Natural Diversity Database, personal communication).

b. MONTANA: *Haplopappus carthamoides* var. *subsquarrosus* was first discovered in Montana in 1993 (Lesica and Stickney 1994). Lesica conducted extensive field surveys in 1995 along the east front of the Beartooth Mountains and on the north and west sides of the Pryor Mountains. As a result of this study, there are currently eight known occurrences of the species in Montana, six along the east front of the Beartooth Mountains and two in the foothills of the Pryor Mountains. These eight sites and the estimated number of plants at each are listed below:

Robertson Draw (ca. 100,000)
Maurice Creek (500-1,000)
Sheridan Campground (100-500)
Wolf Creek (1,000-10,000)
North Fork Grove Creek (500-1,000)
South Fork Grove Creek (500-1,000)
Indian Spring (1,000-10,000)
Sage Creek (100-500)

Further descriptions of these sites are provided in Appendix C.

3. HISTORICAL SITES: None known in Montana where the species was first discovered in 1993.

4. UNSUCCESSFULLY SEARCHED AREAS: *Haplopappus carthamoides* var. *subsquarrosus* was not found in the Gold Creek area of the Beartooth front although seemingly appropriate habitat was present. Grassland habitat around the confluence of Silver Run Creek and the West Fork of Rock Creek, west of Red Lodge was also searched unsuccessfully.
5. AREAS YET TO BE SEARCHED: Grasslands between the west and main forks of Rock Creek just west of Red Lodge were not searched although they appear to have appropriate habitat. Scattered grasslands developed on calcareous soils occur along the northeast front of the Beartooth Mountains between Rock Creek and the Stillwater River. These areas were not searched although they may be appropriate habitat. Portions of the Crow Indian Reservation north of Sage Creek may also have appropriate habitat for *Haplopappus carthamoides* var. *subsquarrosus*.

E. HABITAT

1. ASSOCIATED VEGETATION: *Haplopappus carthamoides* var. *subsquarrosus* was primarily associated with vegetation in the *Festuca idahoensis*/*Agropyron spicatum*, *Artemisia tridentata*/*Festuca idahoensis*, and *Artemisia arbuscula*/*Agropyron spicatum* habitat types (Mueggler and Stewart 1980). Shrub cover was always low, usually 1-5%. Common shrubs associated with *H. carthamoides* var. *subsquarrosus* were *Chrysothamnus nauseosus*, *Artemisia frigida*, *A. tridentata*, and *A. nova*. Grass cover was high (20-50%) with *Agropyron spicatum* and *Festuca idahoensis* the most common species. Forb cover was high (30-75%). Common forbs included *Erigeron caespitosus*, *Antennaria microphylla*, *Phlox hoodii* and *Astragalus adsurgens*. Amounts of bare ground were usually around 5% but went as high as 30%. Three sites had scattered *Pinus flexilis*.

Fire plays an important role in structuring the vegetation associated with *Haplopappus carthamoides* var. *subsquarrosus*. Indeed, a large area in the vicinity of the Robertson Draw population burned within the last five years. Fire kills *Artemisia tridentata* which may take many years to recover. Habitat currently occupied by *H. carthamoides* var. *subsquarrosa* has very low cover of *Artemisia tridentata*, however, much of the adjacent lands are dominated by *A. tridentata*. The relationship among *H. carthamoides*, *A. tridentata* and fire is not known, but it may be that *H. carthamoides* does not tolerate the shade created by dense stands of *A. tridentata* or *Pinus flexilis*. In this case, *H. carthamoides* will occur only at sites where *A. tridentata* and/or *P. flexilis* will not grow or where they are burned frequently enough to prevent dominance.

2. TOPOGRAPHY: *Haplopappus carthamoides* var. *subsquarrosus* most commonly occurs on moderate to steep slopes (10-50% slope) with a cool aspect (NW, N, NE, E). It can be found on warm slopes (as just north of Robertson Draw), but then the slope is more gentle and the plants are sparsely distributed. Populations of *H. carthamoides* var. *subsquarrosus* occurs at 5,500 ft to 7,200 ft in elevation, but are most common at 6,000-6,500 ft.
3. SOIL AND GEOLOGICAL RELATIONSHIPS: Soils associated with *Haplopappus carthamoides* var. *subsquarrosus* generally have a sandy texture and are moderately deep with a high coarse fragment content.

Most populations of *H. carthamoides* var. *subsquarrosus* occur in soils derived, at least in part, from Madison Limestone. Soils along the front of the Beartooth Mountains are developed over gravels composed of both granitics from the core of the mountains and limestone from along the front. The small populations in the valley of Rock Creek occur on soils derived entirely from

granitics. In the foothills of the Pryor Mountains *H. carthamoides* var. *subsquarrosus* occurs on soils derived entirely from Madison Limestone. It appears that *H. carthamoides* var. *subsquarrosus* has evolved on calcareous soils but is capable of existing in small satellite populations on adjacent soils derived from crystalline parent materials. This same pattern of edaphic endemism is found in Wyoming where the majority of populations of *H. carthamoides* var. *subsquarrosus* also occur on calcareous soils, but a few occur on nearby volcanic soils (W. Fertig, Wyoming Natural Diversity Database, personal communication).

4. REGIONAL CLIMATE: Red Lodge (5,575 ft), at the north end of the Beartooth front has mean July and January temperatures of 64.9° F and 21.8° F respectively and mean annual precipitation is 25.0 in. Wettest months are April, May and June (NOAA 1982). The town of Bridger is in the valley of the Clark's Fork of the Yellowstone River at 3,680 ft, ca. halfway between the foothills of the Pryor Mountains and the Beartooth front. Mean July and January temperatures are 70.5° F and 21.5° F respectively, and mean annual precipitation is 12.67 in (NOAA 1982). The climate of the *Haplopappus carthamoides* var. *subsquarrosus* populations is probably warmer and drier than Red Lodge but cooler and wetter than Bridger.
5. DYNAMIC ABIOTIC FACTORS: Fire was the most important disturbance shaping the vegetation in the area where *Haplopappus carthamoides* var. *subsquarrosus* occurs. Fire removes dominant overstory species such as limber pine and sagebrush temporarily or permanently, depending on frequency. Sagebrush and pine reduce the amount of light reaching the ground layer vegetation and may decrease the abundance of sun-loving species including *H. carthamoides* var. *subsquarrosus*. Throughout the areas surveyed, this species was common only in vegetation with tree and/or shrub

cover lower than 10%. *Haplopappus carthamoides* var. *subsquarrosus* did not occur or was only sparsely distributed in habitats with dense sagebrush, even though these sites had similar potential to areas with dense populations. These observations suggest that fire may be important for maintaining appropriate habitat for *H. carthamoides* var. *subsquarrosus* in areas where pine or sagebrush is the eventual climax dominant.

F. POPULATION BIOLOGY

1. PHENOLOGY: *Haplopappus carthamoides* var. *subsquarrosus* has been observed in flower in Montana throughout August. Flowering probably begins in late July, and mature fruit can be found in late August through September. It appears that plants flower somewhat earlier on the Beartooth front compared to the north slopes of the Pryor Mountains.

2. POPULATION SIZE AND CONDITION

a. WYOMING: Fertig (Wyoming Natural Diversity Database, personal communication) reports that there are 13 known occurrences of *H. carthamoides* var. *subsquarrosus* in Wyoming with ca. 100,000 plants among them. He stated that this species is locally common along the limestone front of the Absaroka Range from near Cody to the Montana border.

b. BEARTOOTH FRONT, MONTANA: There are six known populations of *H. carthamoides* var. *subsquarrosus* along the east front of the Beartooth Mountains between the Wyoming border and the main stem of Rock Creek southwest of Red Lodge.

i. The Robertson Draw population consists of seven known subpopulations over an area of ca. 4,000 acres. Other smaller subpopulations probably exist within

this area. The number of plants is estimated to be 100,000. *Haplopappus carthamoides* var. *subsquarrosus* is common in many of the subpopulations.

- ii. The Wolf Creek population has an estimated 1,000-10,000 plants in an area of 50-100 acres. This is likely the densest known population of *H. carthamoides* var. *subsquarrosus* in Montana.
 - iii. The North Fork Grove Creek population is small with 500-1,000 plants over ca. 10 acres. Plants are sparsely distributed.
 - iv. The South Fork Grove Creek population is small with 500-1,000 plants over ca. 10 acres. Plants are sparsely distributed.
 - v. The Mount Maurice population is small with 500-1,000 plants over ca. 10 acres. Scattered colonies may occur in the vicinity of the known population.
 - vi. The Sheridan Campground population is very small with 100-500 plants in ca. 5 acres.
- c. PRYOR MOUNTAINS, MONTANA: Appropriate habitat on the north side of the Pryor Mountains is limited; only two populations are known.
- i. The Indian Spring population is large with an estimated 1,000-10,000 plants occurring throughout an area of ca. 500 acres. *Haplopappus carthamoides* var. *subsquarrosus* is sparsely distributed throughout much of the area, and large portions appear to be unoccupied. The area was not fully surveyed and may be larger than is mapped.

- ii. The small Sage Creek population consists of two subpopulations with 100-500 plants in an area of ca. 10 acres. Plants are sparsely distributed.

3. REPRODUCTIVE BIOLOGY

- a. TYPE OF REPRODUCTION: *Haplopappus carthamoides* var. *subsquarrosus* does not produce rhizomes or other means of vegetative propagation; reproduction is entirely from seed.
 - b. POLLINATION BIOLOGY: Bumblebees (Family Apidae, *Bombus* sp.) were observed visiting the flower heads of *Haplopappus carthamoides* var. *subsquarrosus* on numerous occasions, especially along the front of the Beartooth Mountains. Sulphur butterflies (Family Pieridae, *Colias* sp.) were observed visiting these flowers on at least two occasions. Relatively few other species are blooming in August; however, pollinating insects are common at this time. Thus, it seems unlikely that pollinators would limit seed production in most years.
 - c. SEED DISPERSAL AND BIOLOGY: The achenes of *Haplopappus carthamoides* var. *subsquarrosus* have numerous capillary bristles and are undoubtedly shed in late summer and fall. Windy weather is common, so dispersal is likely by wind. Deer or elk may also disperse achenes when they become attached to fur.
 - d. SEEDLING BIOLOGY: Nothing is known.
4. DEMOGRAPHY: *Haplopappus carthamoides* var. *subsquarrosus* has a stout, woody rootcrown, suggesting that it is a long-lived perennial. Demographic studies of *H. carthamoides* var. *subsquarrosus* have not been done. In August, 1995

a much greater proportion of plants were flowering in the Beartooth populations compared to the Pryor populations. This difference may have been the result of difference in weather between the two areas or it may indicate that the Pryor sites are more stressful.

G. ECOLOGY

1. BIOLOGICAL INTERACTIONS

- a. COMPETITION AND FACILITATION: *Haplopappus carthamoides* var. *subsquarrosus* is most common on cool slopes where vegetation is relatively dense. Most sites had less than 10% bare ground, and combined grass and forb canopy cover averaged 81% (SD=20%). On the other hand, *H. carthamoides* var. *subsquarrosus* was most common in the same places where *Erigeron caespitosus*, *Artemisia frigida* and *Antennaria microphylla* were abundant. These three latter species increase under grazing pressure (Mueggler and Stewart 1980). These observations suggest that *H. carthamoides* var. *subsquarrosus* is able to persist in communities with relatively high levels of competitive pressure, but that establishment may be facilitated by moderate disturbances that produce small-scale safe sites (but see alternative hypothesis below).
- b. HERBIVORY: Evidence of insect herbivory on *Haplopappus carthamoides* var. *subsquarrosus* included small holes and mine tunnels in the basal leaves. no seed head predation was observed, although this may occur later in the season than the observations were made.

Cattle grazing was heavy at the Sheridan Campground site in 1995 as evidenced by the density of cowpies and the closely trimmed grasses. However, there was no evidence of

cattle grazing on the *H. carthamoides* var. *subsquarrosus* plants at this site. The tough, spiny tissue and perhaps resinous chemicals may make this plant unpalatable to cattle.

- c. OTHER BIOTIC INTERACTIONS: If *H. carthamoides* var. *subsquarrosus* is unpalatable to cattle and competes with species that are palatable, it may increase with cattle grazing. Many other species of forbs in the Asteraceae, such as *Gutierrezia sarothrae*, *Arnica* spp., *Aster* spp. and *Erigeron* spp., are unpalatable to cattle (Mueggler and Stewart 1980). This hypothesis is consistent with the observation that the abundance of *H. carthamoides* var. *subsquarrosus* is positively correlated with forbs that are known to have low palatability (e.g. *Erigeron caespitosus*, *Antennaria microphylla*). However, grazing may also result in an increase of shrubby species that compete for light with *H. carthamoides* var. *subsquarrosus*. It seems likely that *H. carthamoides* var. *subsquarrosus* populations are stable or increase with moderate livestock grazing.

2. HYBRIDIZATION: There is no evidence of hybridization of *Haplopappus carthamoides* var. *subsquarrosus* in Montana. No other members of *Haplopappus* occur in the same habitat in the same area.

H. LAND OWNERSHIP

1. U.S. FOREST SERVICE: Most of the Robertson Draw population and all of the Maurice Creek, Sheridan Campground, Indian Spring and Sage Creek populations are on public land administered by the Beartooth District of Custer National Forest. Robertson Draw and Indian Spring are the two largest populations; thus, the majority of

Haplopappus carthamoides var. *subsquarrosus* plants in Montana are on U.S. Forest Service lands.

2. BUREAU OF LAND MANAGEMENT: The North Fork Grove Creek population, a large portion of the Wolf Creek population, and a small portion of the Robertson Draw population are on public land administered by the Bureau of Land Management
3. STATE OF MONTANA: The small South Fork Grove Creek population is on Montana State land.
4. PRIVATE: Approximately half of the Wolf Creek population is on private land. The identity of the owner is not known.

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. THREATS TO KNOWN POPULATIONS

1. FIRE SUPPRESSION: There is some evidence that fire is important for maintaining at least a portion of the *Haplopappus carthamoides* var. *subsquarrosus* habitat along the Beartooth front. This species does not occur with dense or even moderate stands of sagebrush or limber pine. *Haplopappus carthamoides* var. *subsquarrosus* is most abundant in mesic grasslands on cool slopes. These are the habitats most prone to encroachment by sagebrush and pine, although it is not known how many of the *H. carthamoides* var. *subsquarrosus* populations have the potential to support moderate to heavy canopy cover of sagebrush or limber pine. If fire suppression policies allowed sagebrush and pine to increase greatly, much of the present *H. carthamoides* var. *subsquarrosus* habitat in the foothills of the Beartooth would be lost.

In spite of current fire suppression policies on public lands, a large fire occurred in the Robertson Draw area in 1992, burning much of the limber pine savannah and eliminating dense stands

of big sagebrush. This fire probably created habitat for *H. carthamoides* var. *subsquarrosus*.

2. LIVESTOCK GRAZING: The little evidence available suggests that *Haplopappus carthamoides* var. *subsquarrosus* is not threatened by cattle grazing and may even be favored by moderate grazing pressure. Many species of forbs that are unpalatable to cattle provide fair to good forage for domestic sheep (Mueggler and Stewart 1980). Thus, sheep grazing could be detrimental to populations of *H. carthamoides* var. *subsquarrosus*, although there is no empirical evidence to support this hypothesis.
3. ENERGY EXPLORATION AND DEVELOPMENT: Oil and gas development has occurred to the southeast of the east front of the Beartooth Mountains, and oil and gas leasing has been proposed for the Beartooth front area of Custer National Forest. Intense oil and gas exploration and development could adversely impact populations of *Haplopappus carthamoides* var. *subsquarrosus* by destroying habitat; however, it is unlikely that more than a small portion of the *H. carthamoides* var. *subsquarrosus* plants in the area would be destroyed in this way. Much more pernicious is the threat of widespread introduction of aggressive exotic plants (see below) that always accompanies road construction and large-scale disturbances.
4. EXOTIC PLANTS: Knapweed (*Centaurea maculosa*) is present along some roads as well as in native grasslands along the front of the Beartooth Mountains. The semi-arid climate and gravelly soils found in the area are conducive to the spread of this aggressive exotic. There was noticeably more knapweed in 1995 than in 1987 when initial surveys for The Nature Conservancy were conducted (Lesica 1988). If this plant continues to spread it could outcompete and displace many native species (Watson and Renney 1974, Harris and

Cranston 1979; Tyser and Key 1988), *Haplopappus carthamoides* var. *subsquarrosus* among them. Leafy spurge (*Euphorbia esula*) was observed along the road up Robertson Draw in an area that had been burned. This aggressive exotic may also pose a threat to populations of *H. carthamoides* var. *subsquarrosus*.

B. MANAGEMENT PRACTICES AND RESPONSES

1. CATTLE GRAZING: Populations of *Haplopappus carthamoides* var. *subsquarrosus* occur on land that is managed for cattle grazing. The Robertson Draw area has been deferred from livestock grazing since 1988 in order to protect elk winter range (K. Reid, Custer N.F., personal communication). Otherwise all sites continue to be grazed by cattle. Cattle grazing can result in increased cover of sagebrush which is likely to be detrimental to populations of *H. carthamoides* var. *subsquarrosus*. However, cattle grazing may also decrease the vigor and abundance of palatable grasses that compete with this forb, allowing it to increase. By itself, cattle grazing is likely to have a positive effect or no effect on the abundance of *H. carthamoides* var. *subsquarrosus*.
2. FIRE: The U.S. Forest Service and Bureau of Land Management have a policy of fire suppression along the front of the Beartooth Mountains. Without fire, canopy cover of sagebrush and limber pine are likely to increase in some areas supporting populations of *H. carthamoides* var. *subsquarrosus*, especially if cattle grazing results in a significant reduction in bunchgrass vigor. Pine and sagebrush encroachment are evident in many areas along the east front of the Beartooth Mountains.
3. RECREATION AND ROADS: There are a large number of unmaintained dirt and "two-track" roads along the east front of the Beartooth Mountains. The Meeteese Trail road is use by recreationists

during the summer, especially on weekends. Most other roads are currently little used except during hunting season. Hunters and recreationists probably have little direct impact on populations of *H. carthamoides* var. *subsquarrosus*; however, vehicle traffic along roads is one important way that exotic weeds are dispersed into new areas (Sauer 1988, Lonsdale and Lane 1994). Most observed infestations of knapweed and leafy spurge along the east front of the Beartooth Mountains were along roads, especially the Meeteese Trail.

C. RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS

1. MANAGEMENT RECOMMENDATIONS: There are no apparent immediate threats to populations of *Haplopappus carthamoides* var. *subsquarrosus* in Montana. Most or all populations are subject to cattle grazing, but it is not likely that the abundance of *H. carthamoides* var. *subsquarrosus* is reduced by moderate grazing pressure. Long-term threats to the viability of *H. carthamoides* var. *subsquarrosus* do exist. Fire suppression coupled with livestock grazing could result in encroachment by sagebrush and limber pine throughout much of the current *H. carthamoides* var. *subsquarrosus* habitat along the front of the Beartooth Mountains. As recreational use of the area continues or increases, knapweed and perhaps leafy spurge will be spread along the extensive roads in the area. Wildlife will then spread these weeds into the native grassland habitat of *H. carthamoides* var. *subsquarrosus*, likely resulting in a decrease in the abundance of this rare species.

A policy of "let burn" or periodic controlled burning along the east front of the Beartooth Mountains is important for maintaining viable populations of *Haplopappus carthamoides* var. *subsquarrosus* for the long term. It is also important to prevent the spread of invasive exotics into the native grasslands. Currently

patches of weeds are small and mainly confined to roadsides. At this time it may still be possible to eradicate knapweed and leafy spurge in the area by using herbicides. Even if eradication is not possible, the spread of knapweed and leafy spurge could be greatly curtailed by applying herbicide along roadways. A program to educate hunters and recreationists to the possibility and consequences of bringing in weed seed on their vehicles could also play a role in preventing large-scale weed infestations in the habitat of *H. carthamoides* var. *subsquarrosus*.

2. STATUS RECOMMENDATIONS

- a. U.S. FISH AND WILDLIFE SERVICE: *Haplopappus carthamoides* var. *subsquarrosus* is currently listed as C-2 (= species at risk) by the U.S. Fish and Wildlife Service. There are eight known populations with an estimated 100,000+ plants in Montana and no apparent immediate threats to these populations. Observations from Montana do not support a status of C-2 or species at risk; however, surveys and analysis in Wyoming (ca. 50% of the known populations) are required before final recommendations on the status of *H. carthamoides* var. *subsquarrosus* can be made.
- b. U.S. FOREST SERVICE: *Haplopappus carthamoides* var. *subsquarrosus* has a very limited distribution, both globally and in Region One. Although immediate threats are not apparent, the long-term viability is likely to depend on appropriate management of the plant's habitat. Consequently, *H. carthamoides* var. *subsquarrosus* should be placed on the Forest Service sensitive list to ensure that substantial declines do not occur as a result of negligent management.
- c. BUREAU OF LAND MANAGEMENT: *Haplopappus carthamoides* var. *subsquarrosus* should be

individuals and the apparent lack of immediate threats. Nonetheless, C-2 status should be maintained until studies in Wyoming have been completed. *Haplopappus carthamoides* var. *subsquarrosus* should be placed on U.S. Forest Service and Bureau of Land Management lists of sensitive species.

III. INFORMATION SOURCES

- A. HERBARIUM SPECIMENS: Specimens from many of the Montana populations of *H. carthamoides* var. *subsquarrosus* are deposited at the herbarium of the University of Montana (MONTU).
- B. FIELD WORK: Field surveys were conducted by Peter Lesica in June and August of 1995 on the east front of the Beartooth Mountains from the Wyoming border to northwest of Red Lodge and on the north side of the Pryor Mountains. Field forms are deposited at the Montana Natural Heritage Program in Helena.
- C. LITERATURE CITED

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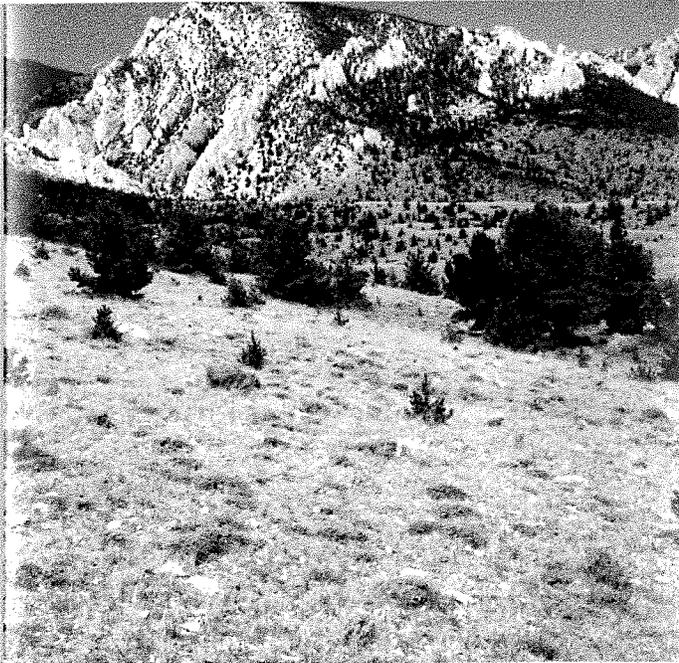
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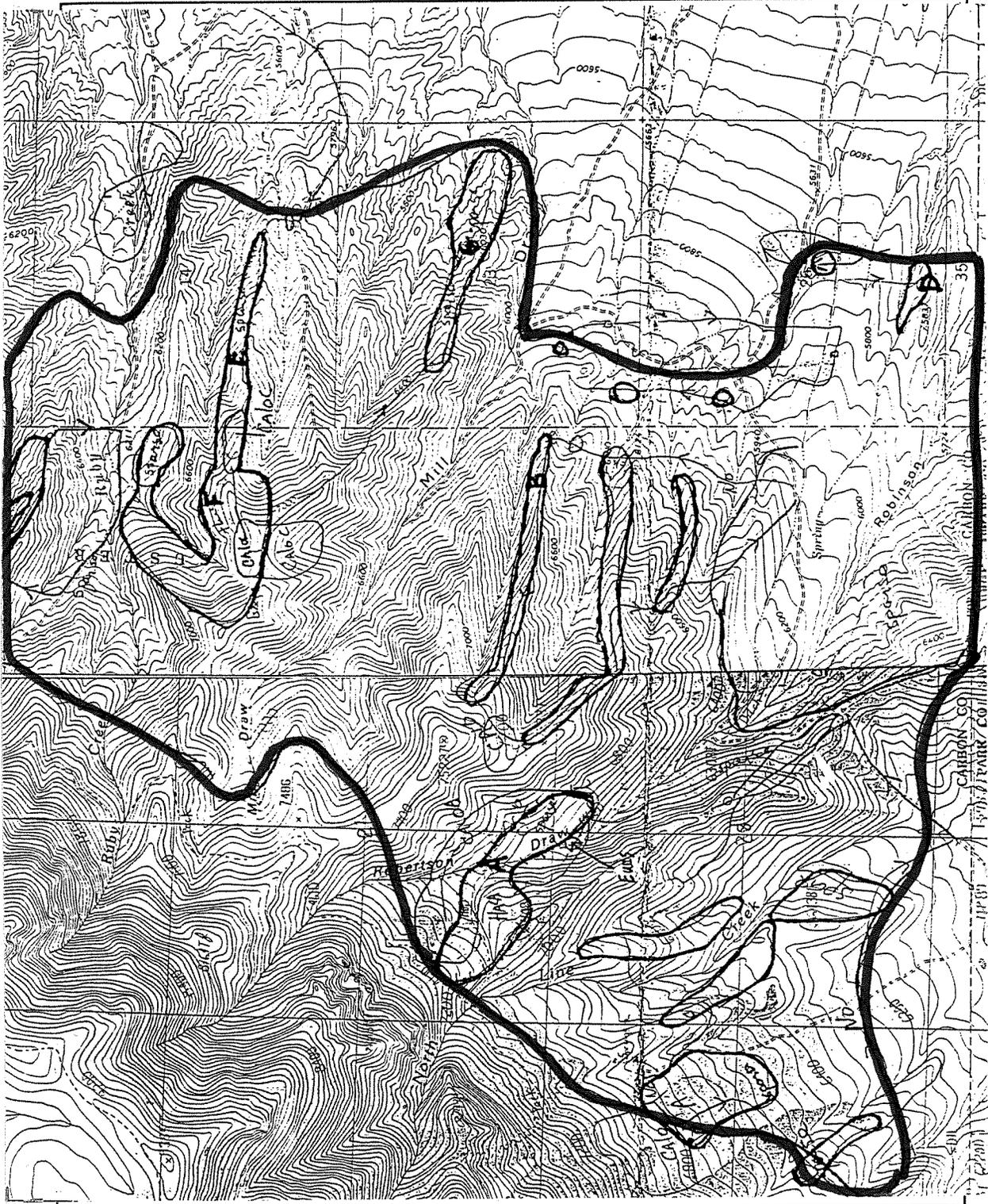
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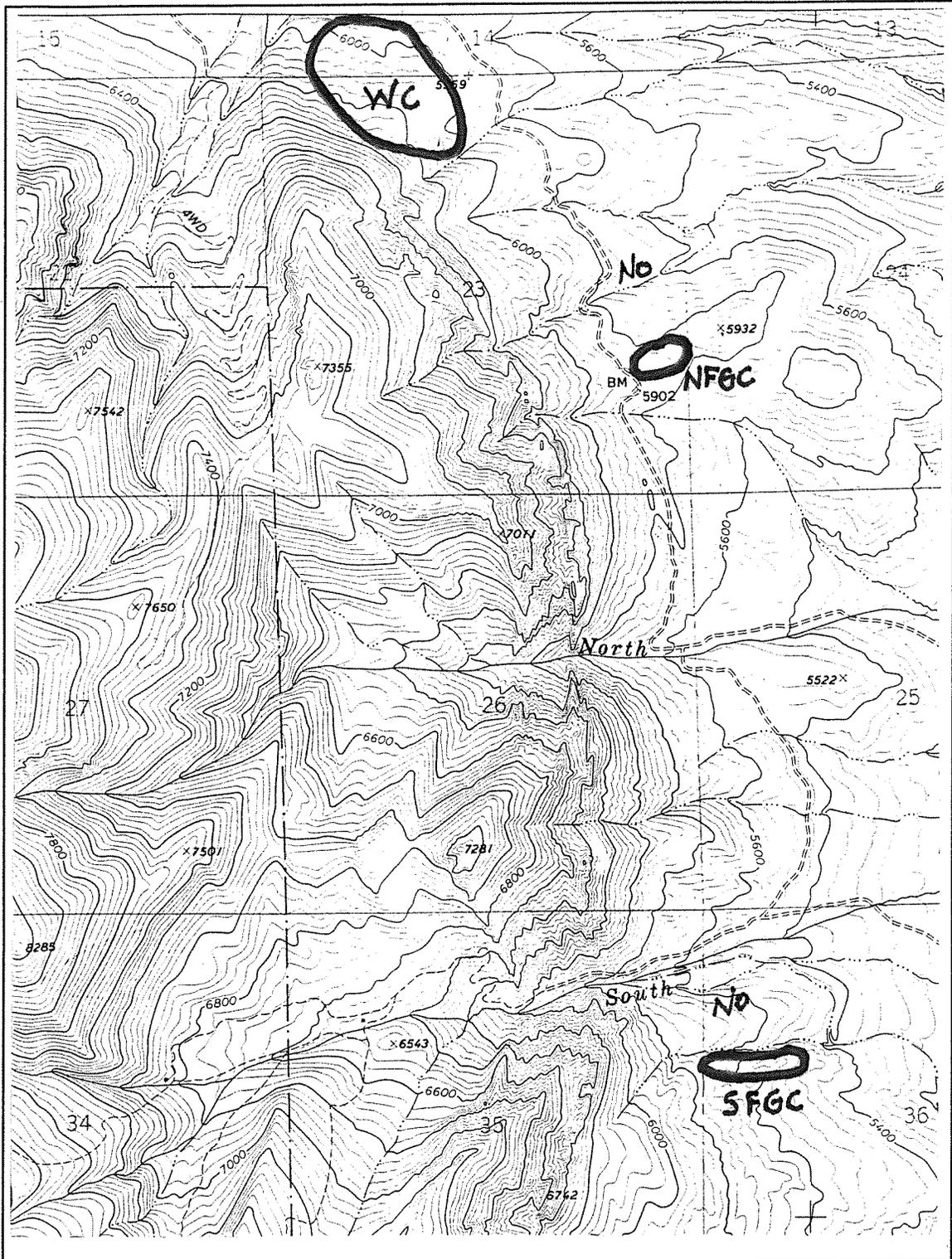
Appendix A. Photographs of *Haplopappus carthamoides* var. *subsquarrosus* and its habitat. **Upper left:** *H. carthamoides* var. *subsquarrosus*, **Upper right:** *H. carthamoides* var. *subsquarrosus*, **Lower left:** habitat of *H. carthamoides* var. *subsquarrosus* at Robertson Draw, **Lower right:** habitat of *H. carthamoides* var. *subsquarrosus* at Robertson Draw, **Bottom:** habitat of *H. carthamoides* var. *subsquarrosus* at Indian Springs.



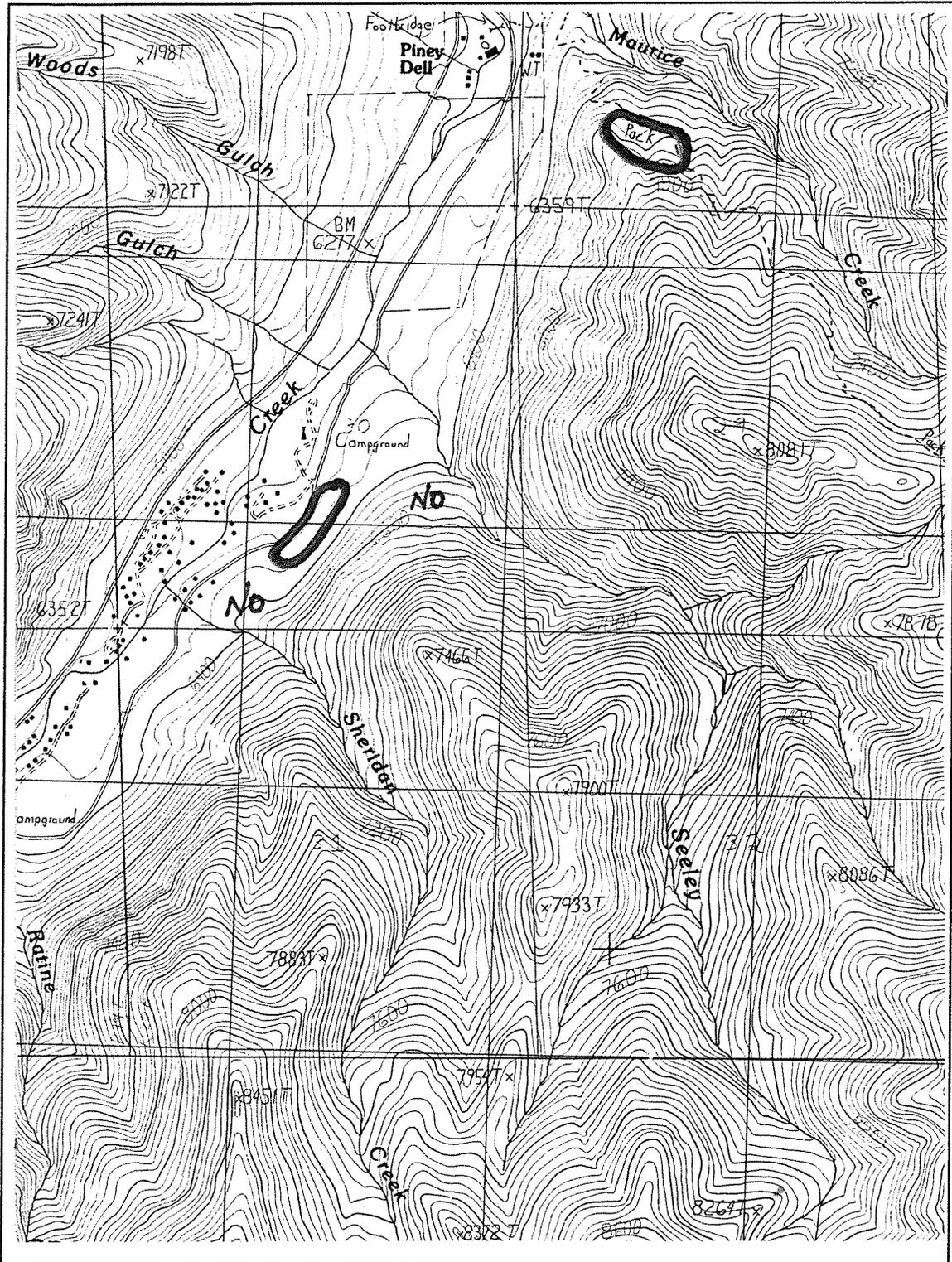
Appendix B. Locations of the known populations of *Haplopappus carthamoides* var. *subsquarrosus* and the area searched unsuccessfully.



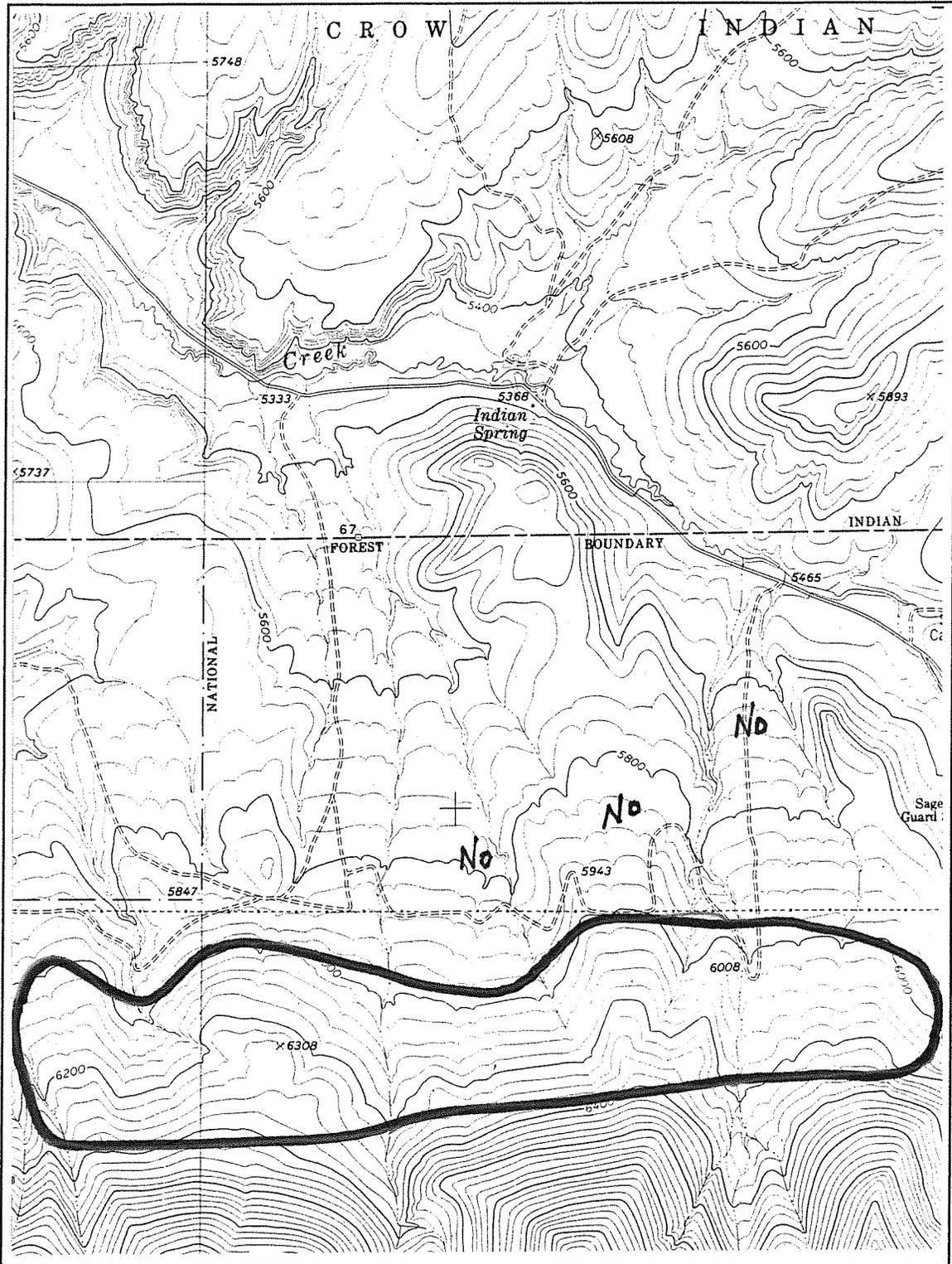
Appendix B-1 Location of Roberston Draw population of *Haplopappus carthamoides subsquarrosus*.



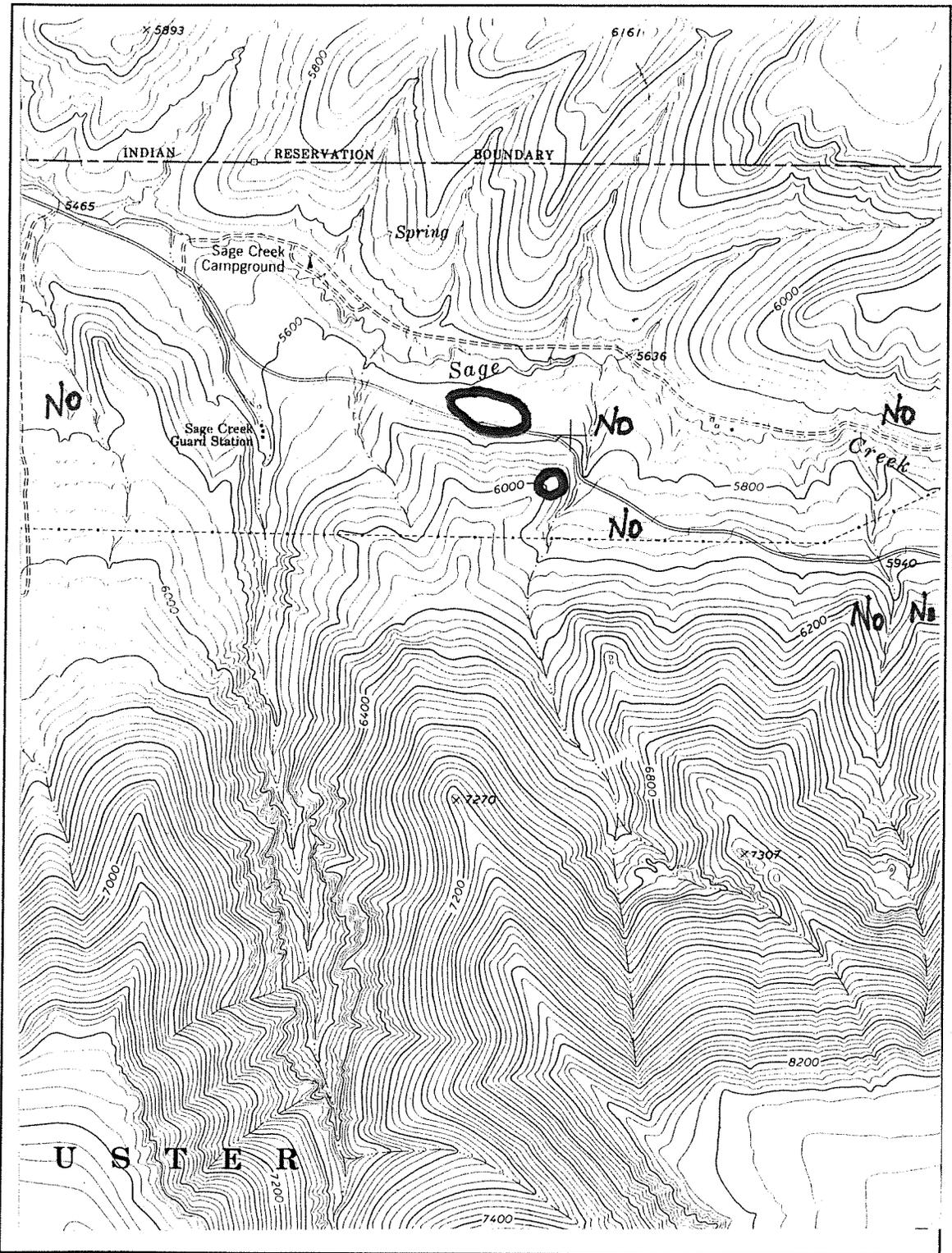
Appendix B-2 Locations of N. Fork and S. Fork Grove Creek and Wolf Creek populations of *Haplopappus carthamoides subsquarrosus*.



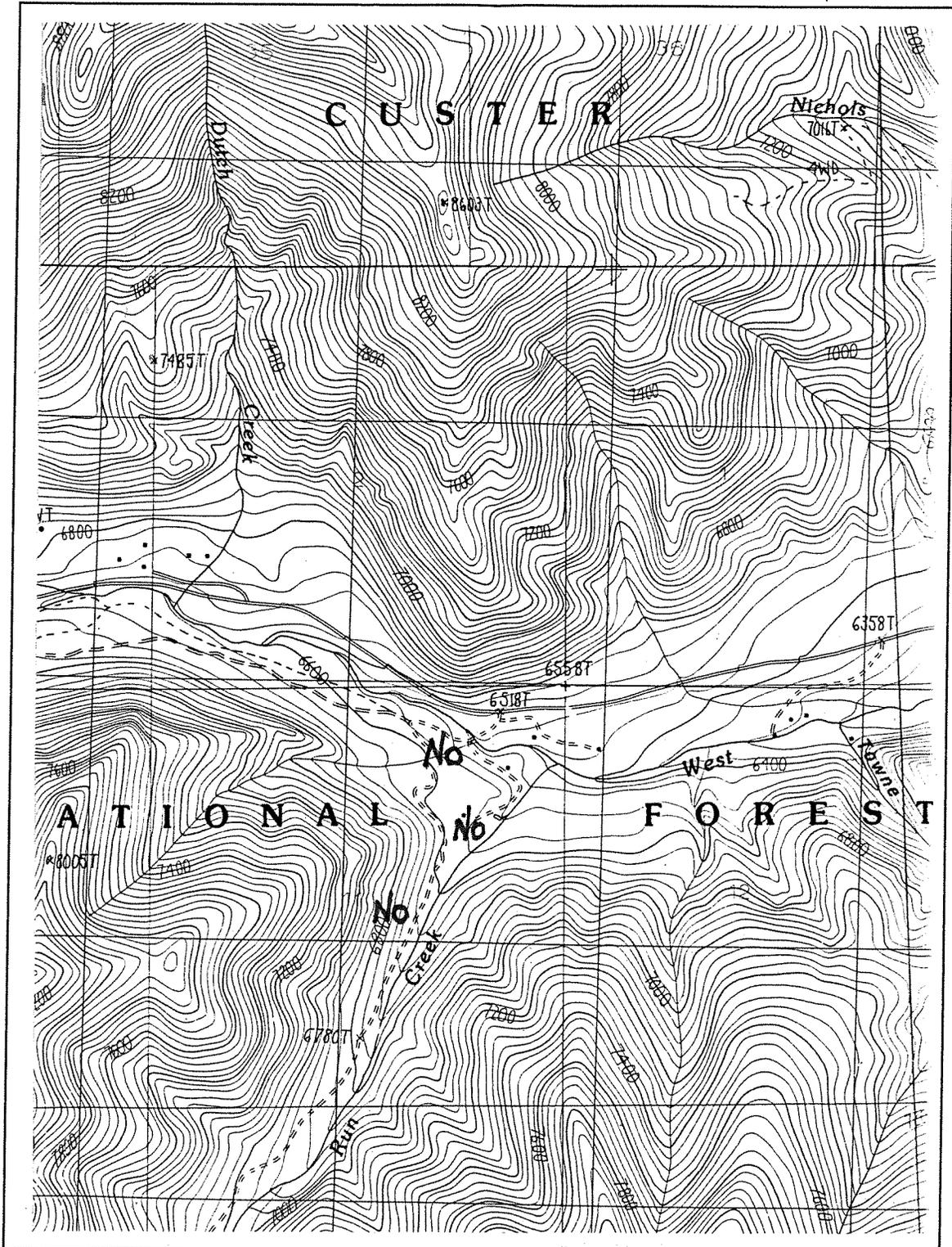
Appendix B-3 Locations of Maurice Creek and Sheridan populations of *Haplopappus carthamoides subsquarrosus*.



Appendix B-4 Location of Indian Spring population of *Haplopappus carthamoides subsquarrosus*.



Appendix B-5 Location of Sage Creek population of *Haplopappus carthamoides subsquarrosus*.



Appendix B-6 Areas searched unsuccessfully for *Haplopappus carthamoides subsquarrosus*.

Appendix C. Element occurrence records for the three known populations of *Haplopappus carthamoides* var. *subsquarrosus*.

placed on a list of sensitive species (see comments on U.S. Forest Service above).

3. MONITORING: Large populations of *H. carthamoides* var. *subsquarrosus*, such as Robertson Draw, Wolf Creek and Indian Spring, should be monitored for invasion of exotic weeds and encroachment by sagebrush and limber pine or Douglas fir. Permanent photo points and periodic "walk through" surveys would serve this purpose well.

D. SUMMARY: *Haplopappus carthamoides* var. *subsquarrosus* is a local endemic occurring along the east front of the Absaroka and Beartooth mountain ranges for a distance of ca. 50 miles between Cody, Wyoming and Red Lodge, Montana. There are eight known populations in Montana with an estimated 100,000+ plants. Populations occur in relatively mesic grasslands, generally on cool slopes that are prone to encroachment by sagebrush and limber pine. *Haplopappus carthamoides* var. *subsquarrosus* does not occur or attains only very low densities in vegetation dominated by sagebrush or limber pine. Five of eight populations of *H. carthamoides* var. *subsquarrosus*, including the two largest, are on public lands administered by the U.S. Forest Service. Two populations and a small portion of a third are on lands administered by the Bureau of Land Management, and one population is on State of Montana lands. All known populations are or have been subject to cattle grazing; however, by itself, cattle grazing probably does not pose a threat to populations of *H. carthamoides* var. *subsquarrosus*. There are no apparent immediate threats to populations of *H. carthamoides* var. *subsquarrosus* in Montana. Long-term threats are from fire suppression and invasion by aggressive exotic weeds. Management plans for the areas in which *H. carthamoides* var. *subsquarrosus* occurs should include provisions for weed control and reintroduction of fire.

Haplopappus carthamoides var. *subsquarrosus* is currently listed as C-2 (species at risk) by the U.S. Fish and Wildlife Service. This status does not appear warranted in Montana due to the large number of

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MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.004
Element occurrence type:

Survey site name: INDIAN SPRING
EO rank: A
EO rank comments:

County: CARBON

USGS quadrangle: INDIAN SPRING

Township: Range: Section: TRS comments:
007S 026E 30 N2
007S 025E 25 E2

Precision: S
Survey date: 1995-05-13 Elevation: 6000 - 6400
First observation: 1995-05-13 Slope/aspect: 25% / NE
Last observation: 1995-05-13 Size (acres): 400

Location:

PRYOR MOUNTAINS, CA. 0.5 AIR MILE SOUTHWEST OF SAGE CREEK GUARD
STATION. TAKE SAGE CREEK ROAD SOUTHEAST PAST INDIAN SPRING TO FS
BOUNDARY. CONTINUE EAST 0.25 MILE, THEN TAKE TWO-TRACK ROAD SOUTH CA.
0.9 MILE.

Element occurrence data:

1,000-10,000 PLANTS, FLOWERING AND IN BUD.

General site description:

DRY, OPEN RESIDUAL MOUNTAIN MIDSLOPE. LIMESTONE PARENT MATERIAL, STONY
SOIL. ASSOCIATED SPECIES: FESTUCA IDAHOENSIS, AGROPYRON SPICATUM,
CHRYSOTHAMNUS NAUSEOSUS, ERIGERON CAESPITOSUS, ANTENNARIA MICROPHYLLA,
HYMENOXYIS ACAULIS, SELAGINELLA DENSA, SENECIO CANUS.

Land owner/manager:

CUSTER NATIONAL FOREST, BEARTOOTH RANGER DISTRICT

Comments:

OBSERVED BY P. LESICA. DISTURBANCE BY CATTLE, TRAILS, ROADS, AND STOCK
TANKS. NOT AS MANY PLANTS FLOWERING AS IN BEARTOOTH POPULATIONS.
PLANTS ARE SPARSE IN LOWER PORTION OF POPULATION.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens: LESICA, P. (7018). 1995. MONTU.

December 6, 1995

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MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.005
Element occurrence type:

Survey site name: MAURICE CREEK
EO rank: B
EO rank comments:

County: CARBON

USGS quadrangle: MOUNT MAURICE

Township: Range: Section: TRS comments:
008S 020E 20 SW4

Precision: S
Survey date: 1995-08-12 Elevation: 6600 - 6880
First observation: 1995-08-12 Slope/aspect: 50% / NW
Last observation: 1995-08-12 Size (acres): 10

Location:
CA. 0.3 MILE SOUTHEAST OF PINEY DELL, ALONG MAURICE CREEK TRAIL.

Element occurrence data:
500-1000 PLANTS, FLOWERING, IN BUD, AND WITH FRUIT.

General site description:
DRY, OPEN GLACIATED MOUNTAIN MIDSLOPE. GRANITIC TALUS PARENT MATERIAL,
STONY SOIL. ASSOCIATED SPECIES: ARTEMISIA TRIDENTATA VASEYANA, FESTUCA
IDAHOENSIS, AGROPYRON SPICATUM.

Land owner/manager:
CUSTER NATIONAL FOREST, BEARTOOTH RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
OBSERVED BY P. LESICA. DISTURBANCE BY LIVESTOCK TRAILS. MAY EXTEND
ONTO ADJACENT PRIVATE LAND.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens: LESICA, P. (7017). 1995. MONTU.

December 6, 1995

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

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Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.007
Element occurrence type:

Survey site name: NORTH FORK GROVE CREEK
EO rank: C
EO rank comments: SMALL, SPARSE POPULATION

County: CARBON

USGS quadrangle: TOLMAN FLAT

Township: Range: Section: TRS comments:
008S 020E 23 SE4

Precision: S
Survey date: 1995-08-12 Elevation: 5880 -
First observation: 1995-08-12 Slope/aspect: 40% / NORTH
Last observation: 1995-08-12 Size (acres): 2

Location:

FROM HWY 212 SOUTH OF RED LODGE, TAKE MEETEESSE TRAIL SOUTH CA. 5 MILES
TO SITE WHICH IS CA. 0.7 AIR MILE NORTH OF NORTH FORK GROVE CREEK.

Element occurrence data:

500-1000 PLANTS, FLOWERING, IN FRUIT, AND IN BUD.

General site description:

DRY, OPEN RESIDUAL MOUNTAIN UPPERSLOPE. LIMESTONE/SANDSTONE PARENT
MATERIAL, STONY SOIL. ASSOCIATED SPECIES: AGROPYRON SPICATUM,
CHRYSOTHAMNUS NAUSEOSUS, GUTIERREZIA SAROTHRÆ, CAREX FILIFOLIA,
ERIGERON CAESPITOSUS, ASTRAGALUS ADSURGENS.

Land owner/manager:

MEETEETSE SPIRES ACEC
BLM: MILES CITY DISTRICT, BILLINGS RESOURCE AREA

Comments:

MAY BE ADDITIONAL PLANTS ON ADJACENT PRIVATE LAND.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens:

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MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

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Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.002
Element occurrence type:

Survey site name: ROBERTSON DRAW
EO rank: A
EO rank comments:

County: CARBON

USGS quadrangle: TOLMAN FLAT
MOUNT MAURICE

Township: Range: Section: TRS comments:
009S 020E 27 N2; 10 S2; 14 S2; 15; 20 SW4; 21; 22 S2; 23 N

Precision: S
Survey date: 1993-08-06 Elevation: 5640 - 7200
First observation: 1993-08-06 Slope/aspect: 5-45% / SE, N, E, NE
Last observation: 1995-08-11 Size (acres): 4000

Location:

FROM CA. 8 MILES SOUTH OF BELFRY TAKE (FS RD 3008) TO ROBERTSON DRAW.
SUBPOPULATIONS LIE ALONG ROBINSON DRAW, RUBY CREEK, MILL DRAW, AND
NORTH LINE CREEK.

Element occurrence data:

1995: 100,000 PLANTS IN AT LEAST 7 SUBPOPULATIONS. FLOWERING, IN LATE
BUD AND WITH IMMATURE FRUIT. 1993: 100+ PLANTS, FLOWERING.

General site description:

DRY, OPEN LOWERSLOPE FOOTHILLS OF GLACIATED MOUNTAINS. LIMESTONE
PARENT MATERIAL. ASSOCIATED SPECIES: ARTEMISIA TRIDENTATA (BURNED), A.
NOVA, FESTUCA IDAHOENSIS, STIPA COMATA, AGROPYRON SPICATUM, A.
DASYSTACHYUM, A. FRIGIDA, CHRYSOTHAMNUS NAUSEOSUS, PHLOX HOODII,
ASTRAGALUS MISER, A. ADSURGENS, ERIGERON CAESPITOSUS, ANTENNIARIA
MICROPHYLLA, KOELERIA CRISTATA, CAREX FILIFOLIA, HYMENOXYS ACAULIS,
OXYTROPIS SERICEA, PINUS FLEXILIS, HESPEROCLOA KINGII, LUPINUS
SERICEUS, PSEUDOTSUGA MENZIESII.

Land owner/manager:

CUSTER NATIONAL FOREST, BEARTOOTH RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BLM: MILES CITY DISTRICT, BILLINGS RESOURCE AREA

Comments:

DISTURBANCE BY FIRE IN CA. 1989. MOST OF AREA GRAZED BY LIVESTOCK.
NUMEROUS ROADS AND SOME EXOTICS.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens: LESICA, P. (6185, 6186). 1993. MONTU.
LESICA, P. (7011, 7014). 1995. MONTU.

December 6, 1995

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

13

Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.003
Element occurrence type:

Survey site name: SAGE CREEK
EO rank: C
EO rank comments: SPECIES IS MORE COMMON WHERE ARTEMISIA TRIDENTATA
IS LESS COMMON.

County: CARBON

USGS quadrangle: INDIAN SPRING

Township: Range: Section: TRS comments:
007S 026E 20 SE4

Precision: S
Survey date: 1995-08-13 Elevation: 5640 - 6000
First observation: 1995-08-13 Slope/aspect: 20% / NORTH
Last observation: 1995-08-13 Size (acres): 10

Location:

PRYOR MOUNTAINS. CA. 0.5 MILES EAST OF SAGE CREEK GUARD STATION ALONG
SAGE CREEK ROAD.

Element occurrence data:

100-500 PLANTS IN 2 SUBPOPULATIONS. FLOWERING AND IN BUD.

General site description:

DRY, OPEN RESIDUAL MOUNTAIN MIDSLOPE. LIMESTONE PARENT MATERIAL, STONY
SOIL. ASSOCIATED SPECIES: ARTEMISIA TRIDENTATA VASEYANA, FESTUCA
IDAHOENSIS, AGROPYRON SPICATUM, CHRYSOTHAMNUS NAUSEOSUS, ERIGERON
CAESPITOSUS, CHRYSOPSIS VILLOSA, PHLOX HOODII, ANTENNARIA MICROPHYLLA.

Land owner/manager:

CUSTER NATIONAL FOREST, BEARTOOTH RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

OBSERVED BY P. LESICA. DISTURBANCE BY CATTLE.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens:

December 6, 1995

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

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Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.006
Element occurrence type:

Survey site name: SHERIDAN CAMPGROUND
EO rank: C
EO rank comments: SITE HEAVILY GRAZED, BUT HAPLOPAPPUS NOT EATEN.

County: CARBON

USGS quadrangle: MOUNT MAURICE

Township: Range: Section: TRS comments:
008S 020E 30 SW4

Precision: S
Survey date: 1995-08-12 Elevation: 6600 - 6880
First observation: 1995-08-12 Slope/aspect: 25% / NW
Last observation: 1995-08-12 Size (acres): 5

Location:
CA. 1.2 MILES SOUTH OF PINEY DELL, ON EAST SIDE OF ROAD JUST SOUTH OF
ENTRANCE TO SHERIDAN CAMPGROUND.

Element occurrence data:
100-500 PLANTS, FLOWERING AND IN BUD.

General site description:
DRY, OPEN SHORT GLACIAL MOUNTAIN SLOPE. GRANITIC TALUS PARENT
MATERIAL, STONY SOIL. ASSOCIATED SPECIES: ARTEMISIA TRIDENTATA
VASEYANA, FESTUCA IDAHOENSIS, ROSA WOODSII, AGROPYRON SPICATUM, POA
SECUNDA, ANTENNARIA MICROPHYLLA, PHLOX HOODII, ERIGERON CAESPITOSUS,
CHRYSOPSIS VILLOSA.

Land owner/manager:
CUSTER NATIONAL FOREST, BEARTOOTH RANGER DISTRICT

Comments:
OBSERVED BY P. LESICA. DISTURBANCE BY CATTLE. ADJACENT TO PRIVATE
LAND.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens:

December 6, 1995

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MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.008
Element occurrence type:

Survey site name: SOUTH FORK GROVE CREEK
EO rank: C
EO rank comments: SPARSE POPULATION

County: CARBON

USGS quadrangle: TOLMAN FLAT

Township: Range: Section: TRS comments:
008S 020E 36 NW4

Precision: S
Survey date: 1995-08-12 Elevation: 5520 - 5760
First observation: 1995-08-12 Slope/aspect: 30% / NE
Last observation: 1995-08-12 Size (acres): 10

Location:

FROM CA. 10 MILES SOUTH OF BELFRY, CROSS RIVER AND TAKE MEETEETSE
TRAIL TO CROSSING OF SOUTH FORK GROVE CREEK. HIKE CA. 0.4 MILE
SOUTHWEST TO SITE.

Element occurrence data:

500-1000 PLANTS, FLOWERING AND WITH IMMATURE FRUIT.

General site description:

DRY, OPEN MID-TO-UPPER RESIDUAL MOUNTAIN SLOPE. LIMESTONE PARENT
MATERIAL, STONY SOIL. ASSOCIATED SPECIES: ARTEMISIA NOVA, AGROPYRON
SPICATUM, PINUS FLEXILIS, KOELERIA CRISTATA, PHLOX HOODII, GUTIERREZIA
SAROTHRAE, HYMENOXYS ACAULIS, ERIGERON CAESPITOSUS, ARTEMISIA FRIGIDA.

Land owner/manager:

STATE LAND - UNDESIGNATED

Comments:

OBSERVED BY P. LESICA. DISTURBANCE BY LIVESTOCK TRAILS.

Information source:

LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens:

December 6, 1995

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

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Scientific Name: HAPLOPAPPUS CARTHAMOIDES VAR SUBSQUARROSUS
Common Name: BEARTOOTH LARGE-FLOWERED GOLDENWEED

Global rank: G4G5T2? Forest Service status:
State rank: S2 Federal Status: C2

Element occurrence code: PDASTDT023.001
Element occurrence type:

Survey site name: WOLF CREEK
EO rank: A
EO rank comments:

County: CARBON

USGS quadrangle: TOLMAN FLAT

Township: Range: Section: TRS comments:
008S 020E 23 NW4; 14 SW4

Precision: S
Survey date: 1995-08-12 Elevation: 6000 - 6280
First observation: 1995-08-12 Slope/aspect: 20% / NE
Last observation: 1995-08-12 Size (acres): 50

Location:

TAKE MEETEETSE ROAD FROM HWY 212 SOUTH OF RED LODGE CA. 4 MILES TO
WOLF CREEK.

Element occurrence data:

1000-10,000 PLANTS, FLOWERING, IN BUD, AND WITH IMMATURE FRUIT.

General site description:

DRY, OPEN RESIDUAL MOUNTIAN MIDSLOPE. LIMESTONE PARENT MATERIAL, STONY
SOIL. ASSOCIATED SPECIES: AGROPYRON SPICATUM, CHRYSOTHAMNUS NAUSEOSUS,
KOELERIA CRISTATA, PHLOX HOODII, ANTENNARIA MICROPHYLLA, ERIGERON
CAESPITOSUS, HAPLOPAPPUS ACAULIS, ASTRAGALUS MISER.

Land owner/manager:

MEETEETSE SPIRES ACEC
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BLM: MILES CITY DISTRICT, BILLINGS RESOURCE AREA

Comments:

OBSERVED BY P. LESICA. MODERATE CATTLE GRAZING IN AREA.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812. PHONE
406/728-8740.

Specimens: LESICA, P. (7016). 1995. MONTU.

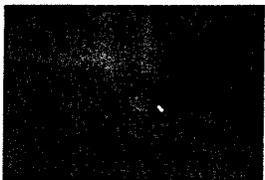
Haplopappus carthamoides
subsquarrosus
Robertson Draw
Aug 1995



Haplopappus carthamoides
Indian Spring
Aug 1995



Haplopappus carthamoides



Robertson Draw
Aug 1995

Haplopappus carthamoides



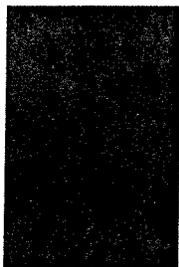
Robertson Draw
Aug 1995 (E)

Haplopappus carthamoides



Robertson Draw
Aug 1995 (A)

Haplopappus carthamoides



Robertson Draw
Aug 1995 (B)

Haplopappus carthamoides



Indian Spring
Aug 1995

Haplopappus carthamoides



Wolf Creek
Aug 1995

Haplopappus carthamoides



Robertson Draw
Aug 1995

Haplopappus carthamoides



Robertson Draw
Aug 1995 (F)

Haplopappus carthamoides
subsquarrosus
Robertson Draw
Aug 95

