

STATUS REPORT ON
Townsendia microcephala
IN SOUTHWESTERN WYOMING

Prepared for the Bureau of Land Management,
Rock Springs District, by

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I. INTRODUCTION

In 1989, botanist Robert Dorn discovered a small population of an unusual Townsendia while conducting field work in southwestern Wyoming. These plants possessed a number of technical features distinguishing them from other known species in the area. Dorn (1992 a) eventually described the plants as a new species, Townsendia microcephala.

Until recently, Townsendia microcephala was known only from the type locality on Cedar Mountain. Due to its limited distribution, the species was designated as a Category 2 candidate species for listing under the Endangered Species Act by the US Fish and Wildlife Service (USFWS) in 1993. Under Bureau of Land Management (BLM) Manual 6840, the BLM is directed to manage USFWS candidate species 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). T. microcephala is currently managed as a Special Status plant species by the BLM Rock Springs District (Amidon 1994).

In 1994, the Rock Springs District and Wyoming State Office of the BLM contracted on a cost-share basis with The Nature Conservancy's Wyoming Natural Diversity Database (WYNDD) to conduct field surveys for Townsendia microcephala on public lands in southwest Wyoming. The objectives of this project were to collect information on the biology, distribution, habitat use, population size, and potential threats to this species to be used in guiding management decisions. In addition, a permanent monitoring plot was established and baseline demographic and population trend data were collected.

II. METHODS

Information on habitat and distribution of Townsendia microcephala 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 in mid to late June, 1994 (survey routes and collection sites are indicated in Appendix B). Data on biology, habitat, population size, and management needs were collected using WYNDD plant survey forms (Appendix C). Locations of occurrences 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 WYNDD.

A single permanent monitoring transect was established on Cedar Mountain, following the protocol of Lesica (1987). The transect consisted of a single belt 1 m x 30 m long, subdivided into 30 1 m x 1 m cells. Within each cell, individual plants were mapped and assigned to one of four age classes: reproductive (in flower), fruiting (with fruit of the current year), post-reproductive (with fruit of the previous year), and vegetative (completely lacking flowering and fruiting heads). The number of flowering, fruiting, and vegetative rosettes per plant was also tallied. This technique generates quantitative data on population size, density, age distribution, and reproductive potential. Baseline data from this transect are included in Appendix D.

III. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Townsendia microcephala Dorn (Dorn 1992 a).
2. SYNONYMS: None.
3. COMMON NAME: Cedar Mountain Easter daisy.
4. FAMILY: Asteraceae (Sunflower family).
5. SIZE OF GENUS: Cronquist (1994) recognizes 25 species in the genus Townsendia, all restricted to western North America. Dorn (1992 b) lists 13 species and 2 varieties of Townsendia in Wyoming.
6. PHYLOGENETIC RELATIONSHIPS: Dorn (1992 a) postulates that Townsendia microcephala is most closely related to T. spathulata. Beaman (1957) noted the close relationship of T. spathulata and T. condensata and suggested that both were derived from T. parryi.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. NATIONAL

- a. LEGAL STATUS: Listed as a Category 2 (C2) species by the USFWS (US Fish and Wildlife Service 1993). Category 2 includes taxa for which there is current evidence of vulnerability, but for which USFWS lacks sufficient biological data or field survey information to support a listing proposal. Townsendia microcephala is also designated as

a Special Status plant species by the Rock Springs District, BLM (Amidon 1994).

b. HERITAGE RANK: Ranked G1 in The Nature Conservancy's Natural Heritage Network system. As a species, Townsendia microcephala is considered critically imperiled because of extreme rarity throughout its range.

2. STATE

a. LEGAL STATUS: None.

b. HERITAGE RANK: WYNDD ranks this species as S1, indicating that it is critically imperiled because of extreme rarity in the state of Wyoming (Fertig 1994).

C. DESCRIPTION

1. GENERAL NON-TECHNICAL DESCRIPTION: Townsendia microcephala is a rosette-forming, taprooted perennial herb (figures 1-2). The leaves are mostly oblanceolate, 1-2.5 mm wide (1/8 in), and moderately to densely pubescent with tangled, soft, woolly hairs. Flower heads are mostly sessile and borne among the leaves. The involucre is 6-8 mm long (1/4 in), and 4-8 mm wide (1/8-1/4 in) with mostly lance-shaped, pointed-tipped bracts with long hairs. Ray flowers are white and 5-8 mm long. The achenes are glabrous and smooth-surfaced with deciduous pappus bristles (Dorn 1992 a, 1992 b; Fertig et al. 1994, in ed.).
2. TECHNICAL DESCRIPTION: Rosulate, taprooted herb with much branched caudex. Leaves mostly oblanceolate, moderately to densely pubescent with multicellular hairs, 3-18 mm long, 1-2.5 mm wide. Heads sessile or nearly so, less than 17 mm in diameter including rays, old ones tending to persist. Involucres 6-8 mm long, 4-8 mm wide. Phyllaries in 3-4 series, mostly lanceolate, acute, margins scarious and lacerate-ciliate, pubescent on back with multicellular hairs, 4-8 mm long, mostly 1-1.5 mm wide. Ray corollas 13-17, white, 5-8 mm long. Disk corollas yellow, about 4 mm long. Pappus of ray and disk flowers similar, of mostly 15-20 barbellate bristles, 3-5 mm long, deciduous. Achenes oblanceolate, compressed, glabrous or nearly so, epapillate, 3-4 mm long, about 1 mm wide (adapted from Dorn 1992 a).

Figure 1. Townsendia microcephala A. Habit. B. Involucre. C. Leaf. D. Achene and deciduous pappus. Illustration by Jane Dorn from Dorn (1992 a).

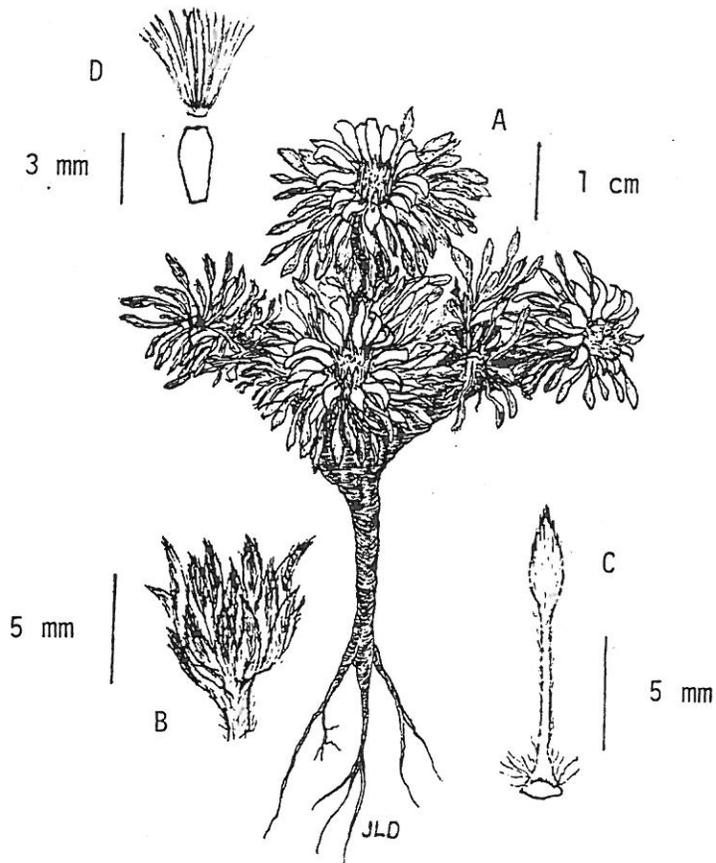


Figure 2. Townsendia microcephala from the west rim of Cedar Mountain, Sweetwater County, Wyoming (Occurrence # 001). Scale provided by a coin. Dispersed achenes, topped by white pappus bristles, are evident in front of the penny. Photo by W. Fertig, WYNDD.



3. LOCAL FIELD CHARACTERS: Townsendia microcephala can be recognized by its rosette growth form, involucre bracts in 2-5 rows, small head size (4-8 mm wide), deciduous pappus, and glabrous achenes lacking surface papillae.
4. SIMILAR SPECIES: Townsendia microcephala is most closely related to T. spathulata and T. condensata (Dorn 1992 a). All three of these species have a rosette growth form and deciduous pappus bristles (Table 1). T. spathulata and T. condensata differ in having larger flower heads (with involucre mostly 8-40 mm wide), and hairy, papillate (bumpy-surfaced) achenes (Dorn 1992 a; Fertig et al. 1994, in ed.). In addition, these species tend to occur on calcareous substrates or high elevation ridges and talus slopes, whereas T. microcephala is found on low elevation, non-calcareous rock outcrops (Dorn 1992 a).

Townsendia nuttallii is the only other species of Easter daisy known to co-occur with T. microcephala. T. nuttallii differs in having narrower involucre bracts arranged in 5-7 series, wider heads, and pubescent achenes (Clark and Dorn 1979). It also flowers earlier than T. microcephala and tends to be less abundant and more widely scattered.

D. GEOGRAPHICAL DISTRIBUTION

1. RANGE: Townsendia microcephala is known from only two mesa-like mountains in southeastern Uinta and southwestern Sweetwater counties, Wyoming (Figure 3). The entire known range of the species falls within an area of approximately 26 square miles (70 square km). The longest distance between known occurrences is only 8.75 miles (14 km).
2. EXTANT SITES: Prior to 1994, Townsendia microcephala was known only from the type locality on the west slope of Cedar Mountain in Sweetwater County (Dorn 1992 a). Surveys in 1994 resulted in the discovery of a second population on Cedar Mountain and a new occurrence on Sage Creek Mountain in Uinta County. In addition, the type population was found to be more extensive than previously recognized. Exact locations of these populations are listed in Table 2. More detailed information is provided in the Element Occurrence Records and maps in Appendix A.

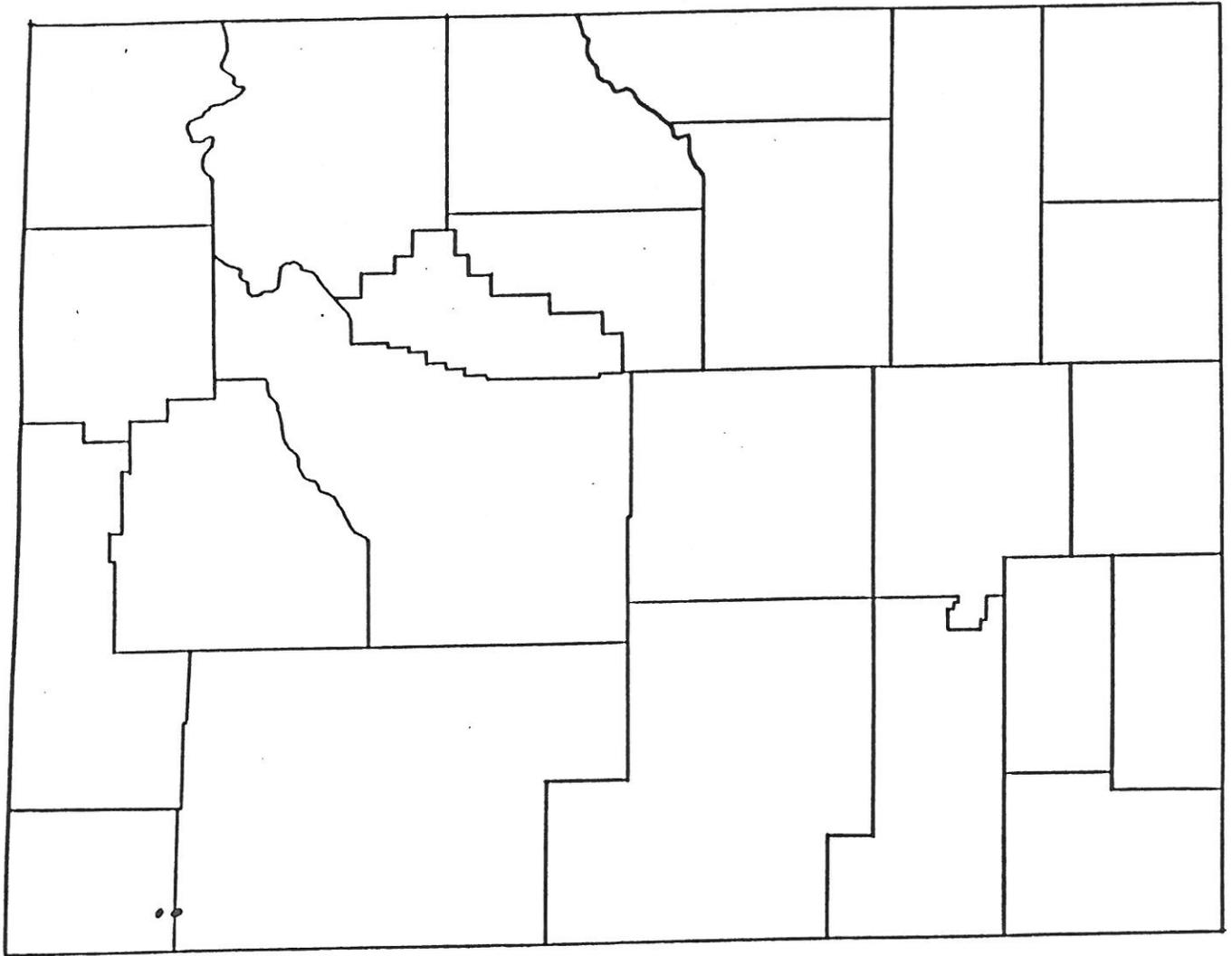
Table 1. Comparison table of selected characteristics distinguishing Townsendia microcephala from similar species in Wyoming (from Dorn 1992 a).

TABLE 1. SELECTED CHARACTERISTICS OF *TOWNSENDIA MICROCEPHALA* AND SIMILAR SPECIES.

Species	Leaf length (mm)	Leaf width (mm)	Leaf pubescence	Involucre width (mm)	Ray length (mm)	Ray color	Achenes glabrous-glabrate	Achenes papillate
<i>T. microcephala</i>	3-18	1-2.5	villous	4-8	5-8	white	yes	no
<i>T. spatulata</i>	3-12 (-22)	1.5-5	woolly to villous	(5-)8-16	5-10(-12)	*	no	yes
<i>T. condensata</i>	4-30	1.5-5	woolly to villous	10-40	8-16(-20)	white, pink, lavender	no	yes

* The following colors have been noted: white, pink, lavender, brownish orange, coppery, bronze, yellowish green.

Figure 3. Wyoming distribution of Townsendia microcephala



3. HISTORICAL SITES: None known.
4. UNVERIFIED/UNDOCUMENTED REPORTS: None known.
5. AREAS SURVEYED BUT SPECIES NOT LOCATED: Surveys in 1994 focused on outcrops of the Bishop Conglomerate in southwestern Wyoming. Suitable, but unoccupied, habitat was surveyed on foot along the northwest and south rim of Cedar Mountain, the summit plateau of Sage Creek Mountain, and the summit, and west and east slopes of Hickey Mountain. Survey routes are shown in Appendix B.

Townsendia microcephala occurs in habitats nearly identical to those occupied by Thelesperma pubescens, another C2 candidate species. Known habitat of T. pubescens is precisely mapped in status surveys conducted by Marriott (1988) and Dorn (1989). These areas should all be considered potential habitat for T. microcephala and should be periodically resurveyed for this species.

E. HABITAT

1. ASSOCIATED VEGETATION: Townsendia microcephala occurs in sparsely vegetated cushion plant communities dominated by low forbs and scattered graminoids (Figure 4). It is absent from areas dominated by mountain mahogany (Cercocarpus montanus) and big sagebrush (Artemisia tridentata) grassland.

2. FREQUENTLY ASSOCIATED SPECIES:

Arenaria hookeri (Hooker's sandwort)
Astragalus spatulatus (Spoonleaf milkvetch)
Carex filifolia (Thread-leaved sedge)
Cryptantha caespitosa (Tufted cat's-eye)
Cryptantha flavoculata (Yellow-eye miners-candle)
Draba oligosperma (Few-seeded draba)
Elymus spicatus (Bluebunch wheatgrass)
Eriogonum acaule (Single-stemmed wild buckwheat)
Eriogonum brevicaulis (Shortstem wild-buckwheat)
Eriogonum caespitosum (Mat wild-buckwheat)
Haplopappus armerioides (Thrift goldenweed)
Haplopappus nuttallii (Nuttall's goldenweed)
Hymenopappus filifolius (Columbia cut-leaf)
Hymenoxys acaulis (Stemless hymenoxys)
Lesquerella alpina var. parvula (Narrow-leaved bladderpod)
Linum lewisii (Wild blue flax)
Oxytropis sericea (White locoweed)

Table 2. Location information for known populations of Townsendia microcephala in southwestern Wyoming.

Occurrence # 001 (composed of 4 subpopulations)

County: Sweetwater/Uinta

Legal Description: T13N R112W S10 (SW4 of SE4); 15 (E2 of NW4 & W2 of SW4), 16 (NE4 of SE4 of SW4), 22 (W2 of W2)

Latitude: 41° 06' 27" N (centrum)

Longitude: 110° 01' 57" W (centrum)

Elevation: 8300-8500 ft (2530-2590 m)

USGS 7.5' Quad: Burntfork

Location: Western rim of Cedar Mountain, paralleling the Rim Road and continuing on the east side of a tributary draw of Dry Creek. An isolated subpopulation is found on the west-facing rim of the next draw to the west on the southwestern slope of Cedar Mountain, about 0.5 miles east of Webb Spring. The entire occurrence is located about 5 air miles north-northwest of Burntfork.

Occurrence # 002

County: Uinta

Legal Description: T13N R113W S3 (SW4 of NE4 & E2 of NW4)

Latitude: 41° 08' 15" N

Longitude: 110° 07' 52" W

Elevation: 8400 ft (2560 m)

USGS 7.5' Quad: Reed Reservoir

Location: Summit and west rim of Sage Creek Mountain, about 5.5 air miles north of Lonetree.

Occurrence # 003

County: Sweetwater

Legal Description: T13N 111W S6 (NE4 of SW4)

Latitude: 41° 08' 00" N

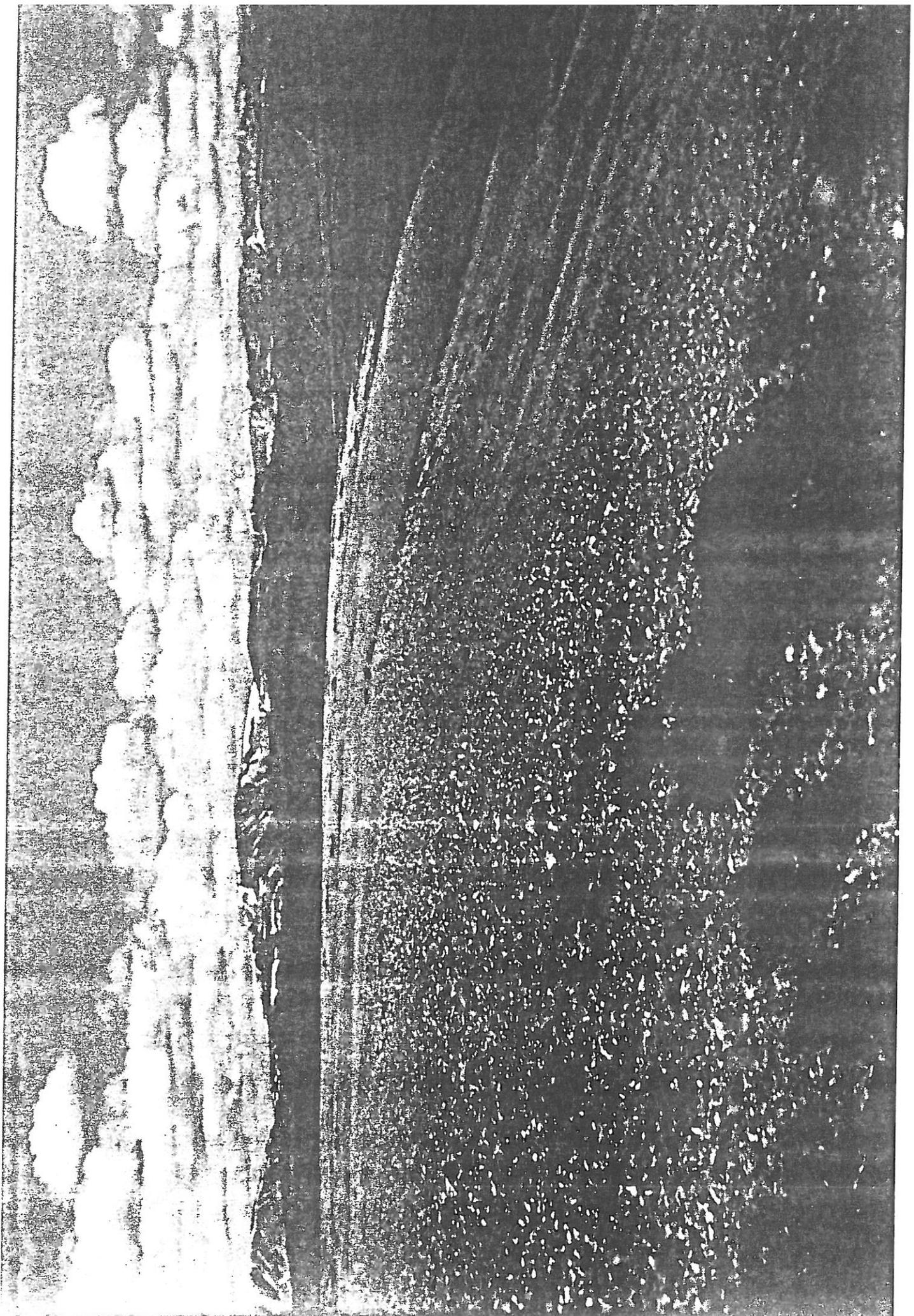
Longitude: 109° 58' 20" W

Elevation: 8200 ft (2500 m)

USGS 7.5' Quad: Horse Ranch

Location: East rim of Middle Canyon of Cedar Mountain, about 1.5 miles southwest of Ringdahl Reservoir and about 7.5 air miles north-northwest of McKinnon. **Note:** This occurrence is only about 3 air miles northeast of Occurrence # 001 and could be considered a subpopulation of it. No suitable habitat, however, was found between the two populations in 1994.

Figure 4. Habitat of Townsendia microcephala on west rim of Cedar Mountain, looking south towards the Uinta Mountains (Occurrence # 001, Sweetwater County, WY). T. microcephala occurs on flats along the edge of the rim and on the upper, west-facing slopes among coarse cobbles of the Bishop Conglomerate. T. microcephala does not occur in areas dominated by Cercocarpus montanus (the dark shrubs in the foreground).



Paronychia sessiliflora (Stalkless whitlow-wort)
Senecio canus (Woolly groundsel)
Thelesperma pubescens (Uinta greenthread)
Townsendia nuttallii (Nuttall's Easter daisy)
Trifolium andinum (Andean clover)

3. TOPOGRAPHY: Townsendia microcephala typically occurs on west-facing rims and adjacent ridgetops, usually within 10-30 feet of the rim (Figure 5). The flat, mesa-like surfaces of Cedar and Sage Creek mountains are remnants of a once continuous erosional plain north of the Uinta Mountains (Dorn 1989).

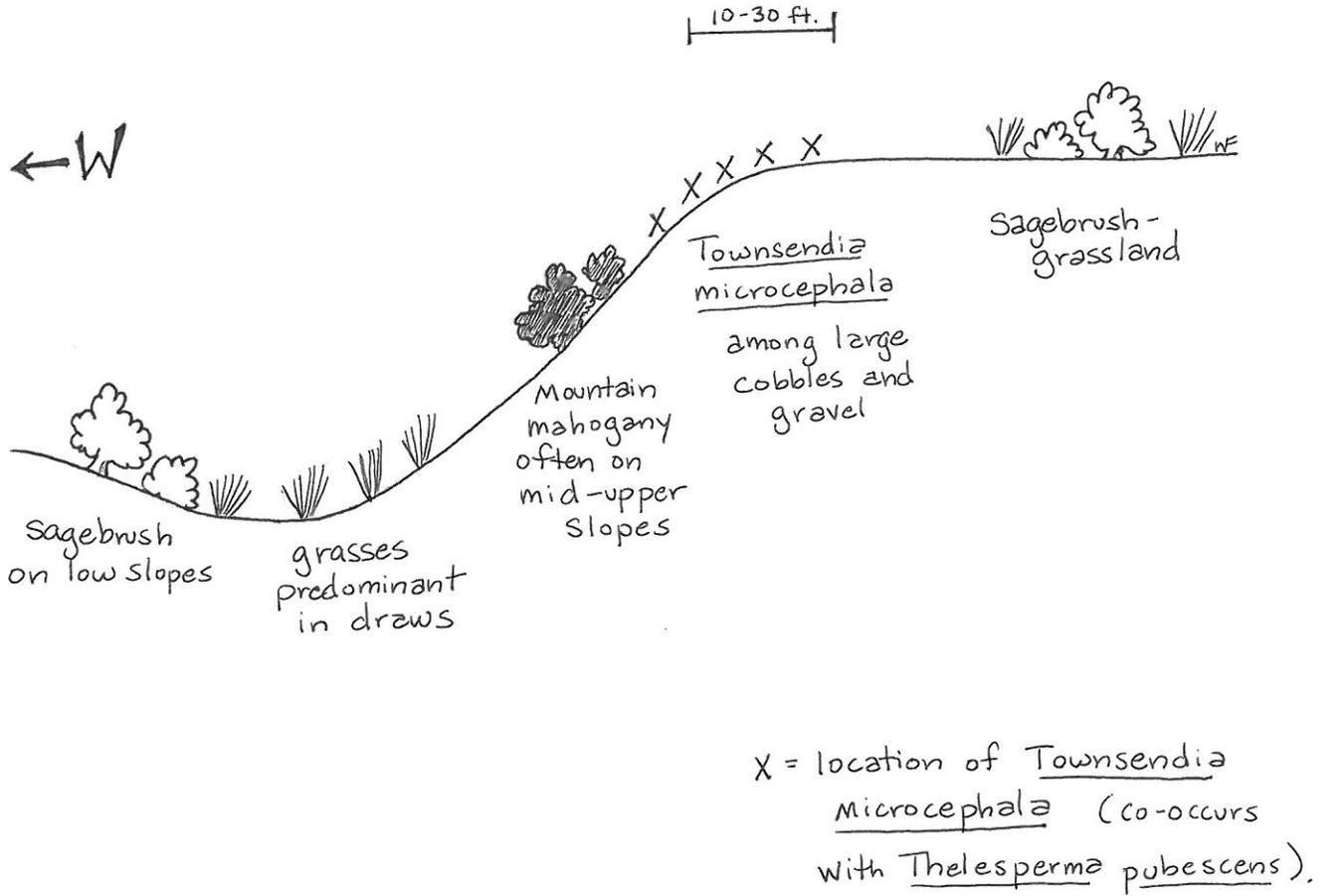
Known occurrences range in elevation from 8200-8500 ft (2500-2590 m).

4. SOIL RELATIONSHIPS: The surfaces of Cedar and Sage Creek mountains are capped by coarse gravel derived from the Oligocene age Bishop Conglomerate (Bradley 1964). Soils are shallow, sandy, and restricted to spaces between gravel and stones.
5. REGIONAL CLIMATE: The habitat of Townsendia microcephala falls within Koppen's cold steppe with winter drought region (Ackerman 1941). Average annual precipitation in the area ranges from 10-12 in (279 mm), with peak levels in June. Mean annual temperature is 40° F (4.4° C), with mean maximum and minimum temperatures in January of 32° and 6° F (0° and - 14° C) and mean maximum and minimum temperatures in July of 82° and 49° F (27° and 9.4° C) (Martner 1986).
6. LOCAL MICROCLIMATE: Townsendia microcephala occurs on west-facing upper slopes and summits, facing the prevailing wind. These winds can be very strong and tend to remove moisture, making sites drier than regional precipitation data would indicate. Habitat is exposed to direct sunlight, making the microclimate drier and warmer.

F. POPULATION BIOLOGY AND DEMOGRAPHY

1. PHENOLOGY: Flowering occurs from late May to early July, probably depending on moisture conditions. In 1994, a drought year, flowering was at its peak on June 22-24. Plants on windy, west-facing rims appear to flower earlier than plants in more sheltered microsites. Fruit mature in June-July. Townsendia microcephala appears to bloom later than T. nuttallii where the two species co-occur,

Figure 5. Position of Townsendia microcephala on the landscape.
Illustration by W. Fertig.



and is one of the later blooming species in a genus noted for early flowering.

2. POPULATION SIZE AND CONDITION: There are currently three known populations of Townsendia microcephala. The largest occurrence consists of four subpopulations isolated by short gaps in suitable habitat. Two of the populations are within 2-3 miles and could be considered a single occurrence if not for a gap in suitable habitat. The three populations occupy a total area of approximately 32 acres. Within this area, however, suitable habitat may account for only 8-10 acres.

In 1994, 330-380 plants were observed during walk-through surveys of the three known occurrences. Intensive surveys within a single, 30 square meter demographic plot, however, resulted in the observation of 133 plants (for an average of 4.43 plants per square meter). Based on this density pattern and the amount of suitable habitat, the total population size of the species is estimated at 2280-4550 plants. This figure is probably a conservative estimate and is likely to be revised upwards with additional intensive sampling.

Populations are generally small and localized in microsites of suitable habitat. T. microcephala exhibits a clumped, non-random, distribution pattern.

Demographic data collected in 1994 is summarized in Table 3.

3. REPRODUCTIVE BIOLOGY

- a. TYPE OF REPRODUCTION: Townsendia microcephala is a perennial that reproduces by seed. Older plants develop multiple-branched caudices bearing 1-5 or more short, leafy stems. There is little evidence to suggest that these branches develop into separate individuals through vegetative means.

Apomixis (asexual reproduction without fertilization or meiosis) is well documented in the genus and is reported as frequent in Townsendia condensata and T. spathulata (Beaman 1957). Apomixis has not yet been shown in T. microcephala but is likely based on its occurrence in closely related species

Table 3. Demographic information for known populations of Townsendia microcephala in southwestern Wyoming.

Occurrence # 001 (West slope Cedar Mountain)

Area: Total = 24 acres.

Number and age of plants: 230-280 plant were observed in flower and fruit during ground surveys in 1994. The total population of the occurrence is estimated at 2000-4000 plants, based on demographic plot data and ocular estimates of suitable habitat.

Density: 4.43 plants per square meter were found in one demographic plot. Plants exhibited a non-random, clumped distribution pattern.

Presence of dispersed seed: Mature fruit were occasionally observed on the ground. Fruit were present in about one-third of all plants observed. 2.87 plants per square meter were in fruit in one demographic plot sampled in 1994.

Evidence of reproduction: Nearly one-half of all plants observed were in flower. 2.2 plants per square meter were in flower in one demographic plot sampled in 1994.

Evidence of expansion/contraction: No baseline trend data are available to determine if the population is stable, expanding, or contracting. This population has been known since 1989.

Subpopulation 1 (Sec 22)

Area: 2-4 acres.

Number and age of plants: An ocular estimate originally placed the size of this population at 100-150 plants. Intensive sampling in a 1 x 30 meter transect resulted in the observation of 133 plants (Appendix D). This transect was located in optimal rim-top habitat, which occupies only a small fraction of the total area of the subpopulation. Based on the amount of suitable habitat available, the size of the subpopulation is probably 1000-2000 plants.

Subpopulation 2 (Sec 15)

Area: ca 17 acres.

Number and age of plants: 95 plants were observed in 5 scattered locations along upper slopes and flats just beyond the rim. Population estimated at 500-800 plants in the field. Based on density patterns observed in subpopulation 1, however, the population size may be in the low thousands.

Subpopulation 3 (Sec 10)

Area: ca 3 acres.

Number and age of plants: Plants were observed to be locally common, but scattered on the edge of the rim in the vicinity of one of the demographic

plots established for Thelesperma pubescens by Marriott (1988). Approximately 30 plants were observed in a brief survey. Additional habitat in the area may support a population in the low hundreds.

Subpopulation 4 (Sec 16)

Area: 0.1 acre.

Number and age of plants: 11 flowering plants were observed in an area of about 58 square meters.

Occurrence # 002 (Sage Creek Mountain)

Area: 1.5-2 acres.

Number and age of plants: 84 plants observed in 1994 at two microsites on the western rim and summit. Total population estimated at 180-250 plants.

Density: Locally common within microsites. Plants exhibit a clumped distribution pattern.

Presence of dispersed seed: None observed on the ground. Many flower heads contained developing fruit.

Evidence of reproduction: Plants on the summit were mostly all in flower, while those on the rim were vegetative or in fruit.

Evidence of expansion/contraction: No baseline trend data are available to determine if the population is stable.

Presence of young mountain mahogany plants within occupied T. microcephala habitat on the summit suggests that adjacent groves of Cercocarpus montanus may be expanding. The long-term result of this could be shrinking of the suitable habitat for T. microcephala.

Subpopulation 1 (summit of mountain)

Area: ca 1 acre.

Number and age of plants: 59 plants observed, population estimated at 150-200.

Subpopulation 2 (western rim of mountain)

Area: 0.5-1 acre.

Number and age of plants: 25 plants observed.

Occurrence # 003 (Middle Canyon, Cedar Mountain)

Area: 6 acres.

Number and age of plants: 27 plants observed in 1994. Total population estimated at 100-300 plants.

Density: Plants are widely scattered on the rim of the mesa.

Presence of dispersed seed: None observed on the ground. Some plants observed with immature or developing fruit.

Evidence of reproduction: Most plants observed to be in bud or full flower.

Evidence of expansion/contraction: No baseline trend data are available to determine if the population is declining, expanding, or contracting.

and in taxa from similar cold, rigorous climates. Polyploidy is not known in sexually reproducing species of Townsendia (Beaman 1957).

- b. POLLINATION BIOLOGY: The pollinator of Townsendia microcephala is unknown. The white ray flowers are likely to attract small insect pollinators. The plants do not exhibit morphological features typical of wind pollinated species.
- c. SEED DISPERSAL AND BIOLOGY: Single-seeded, indehiscent achenes bear a parachute-like pappus of 15-20 bristles. Dispersal is primarily by wind. Strong, eastward-prevailing winds have the potential for long-distance dispersal of fruits. The clumped distribution pattern of the species suggests, however, that fruits are dispersed relatively short distances from the parent plant. Germination requirements of the seed are unknown.

G. POPULATION ECOLOGY

1. GENERAL SUMMARY: Townsendia microcephala occurs in small, localized populations on wind-exposed rims or adjacent flats in cushion plant communities with low total vegetative cover. Occurrences appear to be restricted to gravel flats derived from the Bishop Conglomerate.
2. COMPETITION: Townsendia microcephala does not tolerate shading from taller graminoids or shrubs. Plants are typically absent from slopes dominated by Cercocarpus montanus except where small, sandy-gravel openings are found. Plants are also rarely found on flat summits more than 30-50 feet from the western rim. Community composition often changes at these sites, where sagebrush grasslands replace wind-tolerant cushion plant communities.
3. HERBIVORY: Leaves, stems, and flower heads of Townsendia microcephala showed little to no evidence of herbivory by livestock, native grazers, or insects in 1994. Fruits are likely to be preyed upon by insects and rodents.
4. HYBRIDIZATION: The closest postulated relatives of Townsendia microcephala are T. spathulata and T. condensata (Dorn 1992 a). Neither species is

known to co-occur with T. microcephala and the chances for interbreeding are negligible. T. nuttallii is known to occur in the same habitat as T. microcephala, but tends to flower earlier in the season, thereby avoiding potential hybridization through temporal barriers. There is no field evidence nor experimental data to suggest that T. microcephala is inter-fertile with T. nuttallii or any other species.

H. LAND OWNERSHIP

1. BLM: All currently known populations of Townsendia microcephala are found on lands managed by the BLM Rock Springs District (Green River Resource Area). Occurrences 001 and 002 (west slope of Cedar Mountain and Sage Creek Mountain) are found within proposed Areas of Critical Environmental Concern (ACECs) recommended for Thelesperma pubescens in the preferred alternative of the Green River Resource Area draft Resource Management Plan (USDI Bureau of Land Management 1992).
2. STATE OF WYOMING: One subpopulation of Occurrence 001 (west slope of Cedar Mountain) is found on state-owned lands.
3. PRIVATE: No occurrences of Townsendia microcephala have been found on private lands in the vicinity of Cedar and Sage Creek mountains. Suitable habitat does not appear to occur on private lands.

IV. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. POTENTIAL THREATS TO CURRENTLY KNOWN POPULATIONS: Low population size and a small geographic range make Townsendia microcephala vulnerable to extinction from large-scale habitat loss and chance natural events. The following threats were identified during field surveys in 1994:
 1. MINERAL DEVELOPMENT: Oil and gas exploration is currently active in the foothills north of the Uinta Mountains, including the habitat of Townsendia microcephala. Known occurrences of T. microcephala are limited to rim areas that can be easily avoided by drill pads and other structures. Such areas, however, are vulnerable to damage from road construction or vehicles testing seismic lines.

Development associated with hard-rock mining is a potential future threat if current oil shale classifications and/or withdrawals are lifted (Barbara Amidon, personal communication).

2. GRAZING: Cattle grazing occurs in the vicinity of all known sites of Townsendia microcephala. No plants observed during 1994 exhibited signs of being grazed by livestock or native ungulates. Trampling by livestock is a potential threat if animal activity increases in plant habitat. At current stocking levels, livestock rarely utilize occupied T. microcephala habitat due to the low amount of forage available at these sites. Increased herd size or placement of salt blocks or water tanks in T. microcephala habitat would increase the likelihood of incidental trampling. Horse grazing also occurs on the Cedar Mountain sites, but has not been observed to have a direct negative impact.
 3. RECREATION: Off-road use of motorized vehicles is a threat to Townsendia microcephala populations through loss of individual plants by trampling or habitat degradation due to soil compaction and erosion. The construction of additional roads off of rim areas could also result in loss of individual plants and available habitat. Other recreational activities are not likely to have an impact on the species.
 4. NATURAL: Invasion of Townsendia microcephala habitat by Cercocarpus montanus could be a potential threat. Young mountain mahogany plants were found encroaching on the edge of T. microcephala habitat on the summit of Sage Creek Mountain in 1994. At other sites, Townsendia plants are absent or extremely uncommon in areas of high cover of Cercocarpus. The invasion of mountain mahogany may be the result of favorable recruitment in recent years or fire suppression. Long-term monitoring is necessary to determine if this threat is legitimate or an artifact of unusual climate events.
- B. MANAGEMENT PRACTICES AND RESPONSE: No experimental data exist on the response of this species to management actions, such as prescribed burning or herbicide treatment. Observations in 1994 suggest that Townsendia microcephala is not impacted by livestock grazing, although it could be negatively affected by trampling. The absence of plants in existing roadbeds

in suitable habitat suggests that road construction and trampling by vehicles is a negative impact.

C. CONSERVATION RECOMMENDATIONS

1. RECOMMENDATIONS REGARDING PRESENT OR ANTICIPATED ACTIVITIES: Well pads, roads, and other structures associated with oil, gas, and hard-rock mineral development should be located off-site of occupied Townsendia microcephala habitat. Salt blocks and water tanks should not be placed in T. microcephala habitat in order to minimize trampling by livestock. New roads should not be constructed over rim areas and some little-used two-tracks should be closed to prevent excessive trampling of fragile habitat.

2. NOTIFICATION OF BLM PERSONNEL OF LOCATIONS ON BLM LANDS: To prevent inadvertent impacts to known populations, all appropriate BLM personnel involved in planning and on-the-ground land management activities should be provided with location data for Townsendia microcephala. It is especially important that agency minerals, engineering, and range staff know precise locations so that disturbances can be avoided.

3. AREAS RECOMMENDED FOR PROTECTION: Populations of Townsendia microcephala on the west slope of Cedar Mountain and on Sage Creek Mountain co-occur with Thelesperma pubescens and would be protected within ACECs proposed in the draft Green River Resource Area Management Plan (USDI Bureau of Land Management 1992). Potential habitat on Hickey Mountain would also be protected by a proposed ACEC. Establishment of these ACECs would reduce the need for designating this species as Threatened or Endangered by removing the inadequacy of current protection as a criterion for listing.

D. STATUS RECOMMENDATIONS: Townsendia microcephala should continue to be listed as a C2 candidate by USFWS and as a Special Status plant species by the Rock Springs BLM. Although 1994 surveys resulted in the discovery of several new occurrences and subpopulations, the lack of trend data makes it impossible to determine if the species is increasing, decreasing, or stable at this time. A follow-up survey of known sites and investigation of potential habitat in the vicinity should be conducted in the next 1-3 years to determine population trends. Ideally, such surveys should be

done in non-drought years. Once follow-up studies are done, the status of the species should be reevaluated. If the population is stable or increasing and lacks serious threats it can be considered for downlisting to Category 3C. If populations are in decline or threats increase, T. microcephala should be considered for listing as Threatened.

The BLM Wyoming State Office should list Townsendia microcephala as a state Sensitive species and develop appropriate management strategies to ensure that actions by agency personnel do not contribute to the further endangerment of the species and the subsequent need for listing under the Endangered Species Act.

- E. SUMMARY: Townsendia microcephala is a newly described species restricted to an area of less than 26 square miles in southeastern Uinta and southwestern Sweetwater counties, Wyoming. It is currently listed as a C2 candidate by USFWS and is managed as a Special Status plant species by the BLM Rock Springs District. Prior to 1994, it was known from a single location of less than 3 acres. Surveys in 1994 resulted in the discovery of six new subpopulations, divided into three occurrences on BLM lands on Cedar and Sage Creek mountains. Plants were found to be limited to cushion plant communities on west-facing slopes and adjacent rim tops on thin, rocky soil derived from the Bishop Conglomerate. Population censuses revealed a minimum population of 880-1500 plants. Based on these figures, the total population is estimated at 2280-4550 individuals. T. microcephala was observed to be minimally impacted by current grazing activities, but potentially affected by oil, gas, and hard-rock mining development, road construction, and trampling from off-road vehicles. Encroachment of occupied habitat by Cercocarpus montanus was also identified as a potential long-term threat. Two of the three main populations are within proposed ACECs in the Green River Resource Area. Follow-up surveys and censuses are recommended to determine population trends of the species. Until such studies are completed, it is recommended that the species remain a C2 candidate and be officially designated as a Sensitive species by the BLM Wyoming State Office.

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