STATUS REPORT ON

Yermo xanthocephalus

IN CENTRAL WYOMING

Prepared for the Bureau of Land Management
Wyoming State Office and Rawlins District

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I. INTRODUCTION

While conducting field work in the Beaver Rim area of central Wyoming in 1990, botanist Robert Dorn discovered a small population of an unusual species of composite (Asteraceae). Further study revealed that the species was unknown to science and represented a new genus. Dorn (1991) named his discovery Yermo xanthocephalus, or literally "desert yellowhead".

Dorn observed approximately 500 plants in 2.5 acres of habitat in 1990. Due to its limited distribution, Yermo xanthocephalus was designated as a Category 2 (C2) candidate for listing under the Endangered Species Act (ESA) by the US Fish and Wildlife Service (USFWS) (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).

In 1994, the Rawlins 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 Yermo xanthocephalus on public lands in central 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 Yermo xanthocephalus 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 from June to August 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. Information gathered in the field was entered into the computerized Element Occurrence database of WYNDD.

A permanent monitoring transect was established at the south end of Cedar Rim following the protocol of Lesica (1987). The transect consisted of a single belt 1 m x 40 m long, subdivided into 40 1 m x 1 m cells. Within each cell, individual plants were mapped and assigned to one of four age classes: seedling (stemless plants with

a single rosette of 1-2 leaves), reproductive (in flower or fruit), vegetative (stemless plants with two or more rosettes and three or more leaves), and dead. The number of rosettes per plant was also tallied. This technique generated 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: Yermo xanthocephalus Dorn (Dorn 1991).

2. SYNONYMS: None.

3. COMMON NAME: Desert yellowhead.

4. FAMILY: Asteraceae (Sunflower family).

5. SIZE OF GENUS: Yermo xanthocephalus is the only extant species known from this genus (Dorn 1991).

6. PHYLOGENETIC RELATIONSHIPS: Dorn (1991) considers the genus Yermo to be most closely related to species of Cacalia Section Conophora (especially Cacalia plantaginea) in the tribe Senecioneae. Cacalia species differ in having green involucre bracts, fibrous or fleshy-fibrous roots, and whitish flowers and occur in wet habitats of eastern and mid-western North America, more than 1000 km east of the known habitat of Yermo.

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.

b. HERITAGE RANK: Ranked G1 in The Nature Conservancy's Natural Heritage Network system. As a species, Yermo xanthocephalus is considered critically imperiled because of extreme rarity throughout its range (less than 5 extant occurrences are known).

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: Yermo xanthocephalus is a tap-rooted, glabrous perennial herb with leafy stems to 12 inches (30 cm) high (Figures 1-2). The leathery leaves are alternate, lance-shaped to oval, 1 1/2-10 inches (4-25 cm) long and often folded along the midvein. Leaf edges are smooth or toothed. Flower heads are numerous (25-180) and crowded at the top of the stem. Each head contains 4-6 yellow disk flowers (ray flowers are absent) surrounded by five yellow, keeled involucre bracts. The pappus consists of numerous white bristles (Dorn 1991, 1992; Fertig et al. 1994).

2. TECHNICAL DESCRIPTION: Perennial herb, glabrous except sometimes the achenes. Stems hollow, to 3 dm high, 1 to several from a thick, elongate taproot. Leaves basal and alternate, petioled, coriaceous, lanceolate to ovate or obovate, entire to variously toothed, 4-25 cm long, 1-6 cm wide, gradually reduced upward, generally with a rounded fold lengthwise, the main three veins somewhat parallel. Heads numerous (25-180), in a crowded corymbiform cyme. Involucre cylindrical, 8-15 mm long, the bracts in a single series, (4) 5 (6), strongly keeled, the keel greenish-yellow, the rest bright yellow but drying pale, generally cucullate at tip, usually with a few much reduced bractlets at base. Receptacle naked, flat or sometimes with a sharp projection from center. Rays none. Disk florets usually as many as involucre bracts (4-6), barely exserted from involucre, yellow, the tube about 3 mm long, the throat about 2 mm long, the lobes linear, widely spreading and about 2 mm long. Anthers with a pair of minute lobes at base. Style branches obtuse-truncate and pubescent at tip, stigmatic surface covering entire inner face. Pappus

Figure 1. Line drawing of Yermo xanthocephalus from Dorn (1991). A. Habit. B. Individual head at left, top view of individual head in bud at right. C. Mature achene. D. Disk floret with pappus removed. E. Disk floret with pappus intact. Illustration by Jane L. Dorn.

copious, of capillary bristles, subequal to corolla tube and throat, borne on an expanded disk at top of achene, deciduous in fruit. Achenes short-pubescent, usually about 10 nerved, brown, 6-7 mm long, slightly flattened, elliptic to oblanceolate in outline (adapted from Dorn 1991).

3. LOCAL FIELD CHARACTERS: Yermo xanthocephalus can be recognized by its erect, leafy stems, leathery smooth or toothed leaves, rayless yellow flower heads, and yellow, keeled involucre bracts.

4. SIMILAR SPECIES: Rayless Senecio species (such as S. hydrophilus and S. rapifolius) superficially resemble Yermo but can be distinguished by their more numerous green involucre bracts (Fertig et al. 1994).

D. GEOGRAPHICAL DISTRIBUTION

1. RANGE: Yermo xanthocephalus is endemic to the Beaver Rim area on the western edge of the Sweetwater Plateau and Wind River Basin in southern Fremont County, Wyoming (Figure 3). The entire known range of the species occupies an area of less than 6 acres.

2. EXTANT SITES: This species is known only from the type locality, approximately 6 miles north of Sweetwater Station (Table 1). More detailed information on this single occurrence is provided in the Element Occurrence Record and map in Appendix A.

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 Split Rock, White River, Wagon Bed, and Wind River formations along Cedar Rim and Beaver Rim in southern Fremont County, Wyoming. Intensive surveys covered the area from the north bank of the Sweetwater River north to Oil Mountain and Sand Draw. No new populations were located in these areas. Other surveys from 1990 to 1993 have also failed to uncover additional occurrences of Yermo xanthocephalus (R. Scott, personal communication). 1994 Survey routes are shown in Appendix B.

Figure 2. Yermo xanthocephalus from the south end of Cedar Rim, Fremont County, Wyoming. Plants in full flower in June, 1992. Note the yellow involucre bracts. Photograph by Jennifer Whipple.

Figure 3. Wyoming distribution of Yermo xanthocephalus.

Table 1. Location information for known populations of Yermo xanthocephalus in central Wyoming.

Occurrence # 001 (Cedar Rim)
County: Fremont.
Legal Description: T31N R95W S27 (SW4 of SE4 of SW4) and S34 (NW4 of NE4 of NW4 & NE4 of SE4 of NW4).
Latitude: 42° 37' 25" N (centrum).
Longitude: 108° 10' 55" W (centrum).
Elevation: 6720-6760 ft (2050-2060 m).
USGS 7.5' Quads: Dishpan Butte and Sweetwater Station
Location: South end of Cedar Rim, approximately 2 air miles east-south

E. HABITAT

1. ASSOCIATED VEGETATION: Yermo xanthocephalus occurs in sparsely vegetated cushion plant communities with scattered clumps of Indian ricegrass (Oryzopsis hymenoides) (Figure 4). It is typically absent from surrounding areas dominated by Wyoming big sagebrush (Artemisia tridentata var. wyomingensis), bluebunch wheatgrass (Elymus spicatus) and needle-and-thread (Stipa comata). Y. xanthocephalus is occasionally found in beds of seldom used two-tracks where suitable soils are exposed.

2. FREQUENTLY ASSOCIATED SPECIES:

Arenaria hookeri (Hooker's sandwort)
Astragalus kentrophyta (Thistle milkvetch)
Cirsium aridum (Cedar Rim thistle)
Cryptantha caespitosa (Caespitose cat's-eye)
Eriogonum brevicaule var. micranthum (Shortstem wild buckwheat)
Eriogonum ovalifolium var. purpureum (Cushion wild buckwheat)
Haplopappus armerioides (Thrift goldenweed)
Haplopappus nuttallii (Nuttall's goldenweed)
Hymenoxys acaulis (Stemless hymenoxys)
Ivesia gordonii (Gordon's ivesia)
Linum lewisii (Blue flax)
Lomatium nuttallii (Nuttall's biscuitroot)
Lupinus argenteus (Silvery lupine)
Oryzopsis contracta (Contracted Indian ricegrass)
Oryzopsis hymenoides (Indian ricegrass)
Penstemon paysoniorum (Payson's beardtongue)
Phlox muscoides (Squarestem phlox)
Phlox pungens (Beaver Rim phlox)
Physaria eburniflora (Devil's Gate twinpod)
Senecio canus (Woolly groundsel)
Thermopsis rhombifolia (Round-leaved goldenpea)
Townsendia spathulata (Sword-leaf Easter-daisy)

3. TOPOGRAPHY: Yermo xanthocephalus occurs on low slopes, rim margins, colluvial fans, and bottoms within deflation hollows (Figure 5). These hollows have developed on sites lacking an erosional lag surface (desert pavement) and with low vegetative cover exposed to strong winds (Bynum 1993). The shape and orientation of the hollows allow wind-blown snow to accumulate, providing a critical source of additional moisture in this desert region. Y. xanthocephalus was not found at other sites in the Beaver Rim with favorable substrates that lacked the appropriate topographic relief.

The elevation of known Y. xanthocephalus habitat ranges from 6720 to 6760 feet (2050-2060 m).

4. SOIL RELATIONSHIPS: Yermo xanthocephalus grows in shallow, loamy soils of the Entisol order and can be classified as a coarse-loamy over sandy-skeletal, mixed, Lithic Torriorthent. These soils contrast with the deep, sandy-loam aridisols occupied by adjacent Wyoming big sagebrush grassland communities (Bynum 1993).

Soils utilized by Y. xanthocephalus are likely to be of recent origin due to the lack of diagnostic subsurface horizons. Topsoils have little organic matter and subsurface layers show no accumulation of humus, clay, gypsum, salts, or carbonates. The weak soil development at these sites is probably the result of limited moisture, frigid soil temperatures, and landscape instability caused by wind erosion (Bynum 1993). These soils can be extremely dry and brick-like in consistency in late summer, but are moist below the surface in the spring (R. Scott, personal communication).

Soils on the south end of Cedar Rim are derived from outcrops of the Miocene-age Split Rock Formation (Love 1961; Van Houten 1964). This formation is composed primarily of porous, fine to coarse textured, whitish or tan sandstones and clays. The Split Rock Formation forms a persistent cliff at the top of Beaver Rim, but is mostly buried elsewhere in the Sweetwater Plateau (Van Houten 1964). Y. xanthocephalus has not been documented on similar Tertiary sandstone outcrops of the lower White River, Wagon Bed, or Wind River formations in the Beaver Rim area.

5. REGIONAL CLIMATE: Average annual precipitation in the Cedar Rim area is 10 inches (254 mm), with peak levels from April to June. Mean annual temperature is 44° F (6.7° C), with mean maximum and minimum temperatures in January of 34° and 10° F (1.1° and - 12.2° C) and mean maximum and minimum temperatures in July of 86° and 54° F (30° and 12.2° C) (Martner 1986).

A climate station is maintained at Sand Draw, approximately 9 air miles north of the Yermo xanthocephalus occurrence at the south end of

Figure 4. Habitat of Yermo xanthocephalus in a shallow deflation hollow at the south end of Cedar Rim, Fremont County, Wyoming. Plants occur on white, ashy tufaceous deposits of the Split Rock Formation. WYNDD photograph by W. Fertig.

Figure 5. Position of Yermo xanthocephalus on the landscape. Plants are restricted to low slopes, rims, and colluvial fans in deflation hollows within outcrops of the Split Rock Formation. Y. xanthocephalus is absent from areas within these depressions that are slightly elevated and dominated by high cover of big sagebrush, Junegrass, and bluebunch wheatgrass. Illustration by W. Fertig.

Cedar Rim. Monthly mean temperature and precipitation data from this station are summarized in Table 2 (Martner 1986).

In 1994, Dr. Richard Scott of Central Wyoming College established a climate station at the south end of Cedar Rim specifically to record local climate data for the population of Y. xanthocephalus and other rare plants at this site. This climate station is gathering hourly data on precipitation, air temperature, soil temperature (at depths of 10 and 20 cm), relative humidity, wind speed, wind direction, and solar radiation.

6. LOCAL MICROCLIMATE: Cedar Rim is approximately 800 feet higher than the Sand Draw climate station and is thus cooler and has higher precipitation. The bowl-like topographic relief of the Yermo xanthocephalus habitat captures wind-drifted snow and accumulates run-off from surrounding areas, making these sites more mesic than precipitation data alone might predict. Several more years of local climate data and additional data from surrounding areas are needed to determine the differences in the microclimate between Y. xanthocephalus habitat and surrounding areas (R. Scott, personal communication).

F. POPULATION BIOLOGY AND DEMOGRAPHY

1. PHENOLOGY: Yermo xanthocephalus flowers from mid- June to late July. In wet years, flowers may still be present as late as early August. Mature fruits have been observed on plants from mid July to early September (Fertig et al. 1994; RM records). Individual plants come into flower and fruit at different times of the year, extending the entire phenological period of the species (Dorn 1991).

2. POPULATION SIZE AND CONDITION: The entire known population of Yermo xanthocephalus is restricted to an area of 5-6 acres at the south end of Cedar Rim in southern Fremont County, Wyoming. This population consists of one large subpopulation at the base of Cedar Rim and two smaller satellite subpopulations associated with low sandstone and conglomerate hills less than 0.25 miles to the south (mapped in Appendix A).

Table 2.

Summary of Monthly Climate Data, Sand Draw, Wyoming
Elevation 5960 ft (1820 m) ,
1951-1977

(from Martner 1986)

Month	Mean Temperature °F	°C	Average Precipitation Inches	mm
January	22.9	- 5.1	0.23	5.8
February	26.7	- 2.9	0.38	9.6
March	31.2	- 0.4	0.51	13.0
April	41.2	5.1	1.55	39.4
May	52.3	11.3	1.89	48.0
June	61.9	16.6	1.59	40.4
July	70.5	21.4	0.67	17.0
August	69.0	20.5	0.60	15.2
September	58.0	14.4	0.70	17.8
October	47.3	8.5	0.76	19.3
November	32.8	0.4	0.42	10.6
December	25.4	- 3.6	0.36	9.1
Mean Annual	44.9	7.2	9.66	245.4
Mean April-Sept.	58.8	14.9	7.00	177.8

Dorn (1991) estimated the total population of Y. xanthocephalus to be approximately 500 plants in 1990. Surveys in 1993 and 1994 suggest that the population is slightly larger, approaching 1500 individuals (W. Fertig 1994 field data; R. Scott personal communication). Over 80% of the total population is found in the deflation hollow at the base of Cedar Rim.

A population density of 0.4 plants per square meter was observed at one of the satellite populations in 1994. Plants appear to occur at a somewhat higher density in the main subpopulation at the base of Cedar Rim based on photographic evidence (Figure 4). Within its limited habitat, Y. xanthocephalus is one of the largest and showiest herbs, creating an impression of greater abundance than census data support.

Approximately 31% of all plants observed in demographic monitoring plots were in flower or fruit. Seedlings and vegetative rosettes comprised the remaining 69% of the population. Plants are assumed to be long-lived, although individual rosettes may survive for only one to several seasons. Observations of marked plants suggest that fruit-bearing rosettes often do not survive to flower again the following season (R. Scott, personal communication).

Demographic data collected in 1994 are summarized in Table 3 and Appendix D.

3. REPRODUCTIVE BIOLOGY

a. TYPE OF REPRODUCTION: Yermo xanthocephalus is a perennial that reproduces by seed. Total fruit production appears to be low due to heavy herbivory by insects and drought-induced abortion. In typical years recruitment of seedlings is probably extremely low or nil (Dorn 1991). Establishment is probably episodic and dependent on suitable spring and summer moisture conditions.

Mature individuals of Y. xanthocephalus typically consist of clusters of rosettes from a branched subterranean root crown. Plants could potentially reproduce vegetatively by differential survival of rosettes. It is also possible that

Table 3. Demographic information for known populations of Yermo xanthocephalus in central Wyoming.

Occurrence # 001 (divided into 3 subpopulations)
Area: 5-6 acres.
Number and age of plants: The entire population was estimated at 1500 plants in 1994. Based on demographic monitoring plots, the population was estimated to consist of about 31% flowering and fruiting plants, 25% seedlings (defined as plants with only one rosette with 1-2 leaves), and 44% vegetative plants.
Density: 0.4 plants per square meter were observed at one monitoring plot in a small satellite population. Density is probably higher within the large subpopulation at the base of Cedar Rim.
Presence of dispersed seed: Mature achenes were observed on fruiting plants and on the ground surface below these plants in 1994. The plant's non-random, clumped distribution pattern suggests that dispersal distances are probably low.
Evidence of reproduction: Approximately 1/3 of all plants in this population were observed to be in flower or fruit in 1994.
Evidence of expansion/contraction: 1994 population estimates were three times higher than in 1990 (Dorn 1991), although this may reflect a more thorough survey effort rather than a population increase. Additional trend data are needed to determine if the population is stable, increasing, or decreasing.

neighboring plants may be joined below ground by deep rhizomes, although such structures have not been observed in herbarium specimens or in the field.

b. POLLINATION BIOLOGY: Yermo xanthocephalus is probably pollinated by visually-oriented insects attracted to its bright yellow ray flowers and involucre bracts (Dorn 1991). The identity of these pollinators, however, is not known at present.

c. SEED DISPERSAL AND BIOLOGY: The fruits of Yermo xanthocephalus are single-seeded achenes with a parachute-like pappus of slender bristles. At maturity, the involucre bracts spread laterally to expose the fruits to dispersal by the wind. Strong winds in the Beaver Rim area have the potential to disperse these fruits over long distances. The clumped distribution pattern of Y. xanthocephalus, however, suggests that dispersal distances are relatively short.

The germination requirements of seeds are currently unknown. Like other cold desert species, seeds may require a period of cold treatment and sufficient moisture conditions in order to germinate.

G. POPULATION ECOLOGY

1. GENERAL SUMMARY: Yermo xanthocephalus occurs in snow-drift accumulating deflation hollows with low total vegetative cover. Occurrences appear to be restricted to recent soils derived from sandstones of the Split Rock Formation. Populations are generally small, but appear to be stable at present. The plant is a classic "K" selected species characterized by a long-lived perennial growth form, adaptation to severe habitats, and low annual reproductive output.

2. COMPETITION: Colonies of Yermo xanthocephalus occur on barren or semi-barren sites with total vegetative cover of less than 25%. The absence of competing vegetation suggests that Y. xanthocephalus may be intolerant of competition, although it is equally plausible that other species are poorly adapted to these microhabitats.

3. HERBIVORY: Leaves and stems of Yermo xanthocephalus showed no evidence of herbivory by native grazers or livestock in 1994. Flower buds, flowers, and fruits have been observed with damage from insect grazers. Herbivory may have a significant negative impact on the production of viable fruit (Dorn 1991).

4. HYBRIDIZATION: There is no evidence that Yermo

xanthocephalus hybridizes with any other species.

H. LAND OWNERSHIP: The entire known range of Yermo xanthocephalus occurs on lands managed by the Lander Resource Area of the BLM Rawlins District. No populations are found on state or private lands in the vicinity of Beaver Rim.

IV. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. POTENTIAL THREATS TO CURRENTLY KNOWN POPULATIONS: Low population size and a small geographic range make Yermo xanthocephalus extremely vulnerable to extinction from large scale habitat degradation and chance natural events. The following threats were identified during field surveys in 1994 or have been reported in the literature:

1. MINERAL DEVELOPMENT: Oil and gas exploration in the Beaver Rim area is a potential threat to Yermo xanthocephalus habitat. Construction of access roads and pipelines through occupied habitat is a threat due to trampling of individual plants by vehicles or soil compaction and erosion. A two-track leading to an abandoned oil well currently bisects the single occurrence of Y. xanthocephalus. Although some plants are present in the roadbed, total numbers are lower than in adjacent, undisturbed habitat. Seismic exploration utilizing explosives or trampling by vehicles transporting testing equipment is also a threat to the plant's habitat.

2. RECREATION: Off-road use of motorized vehicles for recreation is probably the greatest current threat to Y. xanthocephalus through trampling of plants and damage to soils. The threat from vehicle trampling is greatest in spring and summer when plants are in flower or heavy with developing fruit. Late fall recreational use (such as during hunting season) is probably a lesser threat because the plants have already dispersed their fruits or are entering dormancy. There are currently no physical barriers to prevent vehicle access to the three subpopulations of Y. xanthocephalus.

3. GRAZING: Cattle grazing occurs in the immediate vicinity of occupied Y. xanthocephalus habitat. Although livestock are not likely to graze the plant, there is a threat from animal trampling. Due to low forage availability and the lack of water, livestock appear to utilize Y. xanthocephalus habitat primarily as a travel corridor between adjacent sagebrush-grassland pastures. Individual Yermo plants and transect markers have been observed to be trampled or dislodged, presumably by livestock or horses (these plants and markers were located far from vehicle routes). There are currently no barriers to prevent livestock access to these sites.

4. NATURAL: Prolonged drought and fruit predation by insects may serve to prevent the population of Y. xanthocephalus at Cedar Rim from expanding to other potentially suitable sites in the Beaver Rim area (Dorn 1991). Due to its small range and low numbers, Y. xanthocephalus is vulnerable to extinction through chance environmental catastrophes. Cedar Rim may provide the last refugium for an ancient species heading towards extinction naturally (Dorn 1991).

B. MANAGEMENT PRACTICES AND RESPONSE: There are no experimental data on the response of this species to management actions such as prescribed burning or herbicide treatments. Observations in 1994 suggest that Yermo xanthocephalus is potentially vulnerable to trampling by vehicles or livestock. At present nothing is known of the germination requirements of seeds and cultivation and transplanting techniques have not been developed.

C. CONSERVATION RECOMMENDATIONS

1. RECOMMENDATIONS REGARDING PRESENT OR ANTICIPATED ACTIVITIES: The immediate habitat of Yermo xanthocephalus should be removed from oil, gas and other mineral leasing, or permits should be issued with No-Surface Occupancy stipulations to prevent potential habitat degradation associated with the construction of pads, access roads, and pipelines. Seismic testing involving explosive grids or other surface disturbing techniques should not be allowed within occupied Y. xanthocephalus habitat. To reduce incidental trampling from vehicles and livestock, two-track roads should be rerouted around the area of occupied Y. xanthocephalus habitat. Physical barriers should be put in place to prevent further use of existing roadbeds within these areas. Ideally, the area inhabited by Y. xanthocephalus should be fenced, incorporating natural features and a buck and pole fence that will restrict vehicle access while not interfering with wildlife mobility. To further discourage livestock use, salt blocks and water tanks should not be placed within occupied Y. xanthocephalus habitat.

Fruits of Y. xanthocephalus should be collected for use in developing a captive population of the species. Additional research is needed to develop propagation techniques. Local nurseries, University horticulture departments, and public arboreta should be consulted for expertise in growing and breeding the plants in captivity.

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 Yermo xanthocephalus. 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: The entire range of Yermo xanthocephalus is currently unprotected. The existing Beaver Rim Area of Critical Environmental Concern (ACEC) is located approximately 3 miles west of the Cedar Rim area (Jones 1989). The boundaries of the ACEC should be expanded eastward to include the south end of Cedar Rim and the adjacent low sandstone hills inhabited by Y. xanthocephalus, or this isolated area should be added as a satellite to the ACEC. If this is not feasible, this area should be designated as its own ACEC. In addition to the population of Y. xanthocephalus, an ACEC at the south end of Cedar Rim would also protect habitat for Cirsium aridum (Cedar Rim thistle), Physaria eburniflora (Devil's Gate twinpod), Phlox pungens (Beaver Rim phlox) and Contracted Indian ricegrass (Oryzopsis contracta), four additional USFWS Category 2 candidate species (Fertig 1995, in ed.; WYNDD records).

D. STATUS RECOMMENDATIONS: Yermo xanthocephalus was designated as a C2 candidate by the USFWS in 1993 based on the need for additional survey information before a decision could be made on the need for possible listing under the ESA. At the time of this designation, the species was known from a single population of about 500 plants in 1 hectare (2.5 acres) of habitat (Dorn 1991). Surveys since 1992, including the current study, have failed to locate additional occurrences, and have shown that the known population is only slightly larger in number and area than originally reported. Although long-term trend data are still lacking, the best current field evidence indicates that listing of Y. xanthocephalus as Endangered under the ESA is justified based on the following criteria:

a) Small population size (the total population of Y. xanthocephalus is currently estimated to be 1500 individuals occupying a total area of 5-6 acres at a single site).

b) Above average degree of threat (small population size makes the species extremely vulnerable to extinction through chance environmental events or through habitat degradation associated with oil and gas development, road construction, and trampling by vehicles and livestock).

c) Inadequacy of current protection (the species is currently protected only under provisions of BLM Manual 6840; no areas of occupied habitat are currently protected within designated special management areas).

d) Taxonomic distinctiveness (as the only species in its genus, Y. xanthocephalus is extremely significant in

understanding evolutionary relationships in the Asteraceae and in answering phytogeographic questions).

Sufficient data are now available to warrant upgrading the status of Y. xanthocephalus from Category 2 to Category 1 in anticipation of eventual listing as Endangered under the ESA.

The BLM Wyoming State Office should list Yermo xanthocephalus 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.

E. SUMMARY: Yermo xanthocephalus is a recently described Wyoming endemic known only from the south end of Cedar Rim on the summit of Beaver Rim in southern Fremont County. The species is nearly unique in the Asteraceae in having yellow involucre bracts and is considered to be the sole member of its genus. Y. xanthocephalus is currently designated as a C2 candidate by the USFWS. It is known from a single population occupying an area of less than 6 acres of suitable habitat. This population (consisting of three subpopulations) contains an estimated 1500 plants. The species appears to be restricted to shallow deflation hollows in outcrops of Miocene sandstones of the Split Rock Formation. These wind-excavated hollows are oriented to accumulate drifting snow and appear to be more mesic than surrounding areas. The vegetation of these sites is typically sparse, consisting primarily of low cushion plants and scattered clumps of Indian ricegrass. Surveys since 1990 have failed to locate additional populations on outcrops of the similar White River, Wagon Bed, and Wind River formations in the Beaver Rim area. The existing population is potentially threatened by surface disturbances associated with oil and gas development, trampling by vehicles and livestock, and chance natural events. None of the habitat of Y. xanthocephalus is currently protected within a designated special management area, although the nearby Beaver Rim ACEC could be expanded to include the entire range of the species. Additional demographic monitoring is needed to determine population trends for the species. Despite the lack of trend data, sufficient evidence exists at present to justify upgrading Y. xanthocephalus from C2 to C1 status by the USFWS in preparation for eventual listing as Endangered under the ESA.

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Appendix A.

Element Occurrence Records

and

Population Maps

for *Yermo xanthocephalus*

Appendix B.

1994 Survey Routes

Appendix C.

Special Plant Survey Form

WYNDD

Appendix D.

Monitoring Data, 1994

Yermo xanthocephalus (Desert yellowhead)

Demographic Monitoring Data

Date: 26 July 1994 Surveyor: Walter Fertig

Transect Location:

County: Fremont
Occurrence: EO # 001
Legal Description: T31N R95W S34 NW4 of NE4 of NW4.
Orientation: 160° magnetic North
USGS Quad: Dishpan Butte
Directions: From the Sweetwater Station rest area at the junction of US Highway 287 and Wyoming State Highway 135, proceed north on Highway 135 approximately 7 miles to the Cedar Rim Draw Road. Turn right onto the Cedar Rim Draw Road and proceed northeast about 2 miles to an unmarked dirt two-track on the south side of the road. Turn onto this road and proceed until reaching a "Y". Bear to the right (west) and continue on this two-track paralleling the west side of Cedar Rim. At the south end of the rim, park and proceed to the fenced climate station maintained by Central Wyoming College. From the climate station follow a compass bearing due south to the low sandstone escarpment. A short piece of orange-tipped re-bar marks the origin of the transect (Figure 6).

Sampling Method: A 40 x 1 meter belt transect was established with starting points indicated by orange re-bar and a low rock pile. A meter tape formed the baseline and meter sticks framed each 1 x 1 meter subdivision. 40 contiguous plots were read following the left side of the tape, beginning from the origin. Locations of individual rosettes were mapped and given X, Y coordinates. One of four age classes were assigned to each plant: S (seedling, with a single rosette of 1-2 leaves); R (reproductive, with flowering or fruiting stems); V (vegetative, without flowering or fruiting heads and with 2 or more rosettes); D (dead). The number of flowering and fruiting heads per plot was also recorded.

Habitat: Barren, essentially flat, whitish-gray sandstone deposits at base of low hardpan escarpment. Vegetative cover very sparse, averaging 5-20%. Rock cover low over most of the transect. Associated species include: Haplopappus nuttallii, Astragalus kentrophyta, Cirsium aridum, Phlox muscoides, Oryzopsis hymenoides, Ivesia gordonii, Arenaria hookeri, and Cryptantha caespitosa.

Summary of Results: Since monitoring was only initiated in 1994, no information on population trends is available at this time. The

accompanying data sheets summarize baseline data collected this year. Because of drought conditions in 1994, production may have been adversely affected.

Discussion and Recommendations: Follow-up monitoring should be conducted at this site every 1-3 years. Monitoring yearly would provide valuable data on reproductive success, seedling establishment, and longevity of individual plants. Periodic monitoring (every 2-3 years) would provide population trend data for this site only, but could provide inferences to overall trends of the species. Replicate transects should be established at 4-5 other locations at this site.

Figure 6. Location of monitoring plot

Yermo xanthocephalus Transect # 1
Census Data

Date: 26 July 1994 Surveyor: Walter Fertig

Subdiv #	Total #	# S	# R	# V	# D	# rosettes	Notes
1	1	0	0	1	0	5	With Cirsium aridum. Cover ca 65%
2	1	0	1	0	0	7	Cover ca 10%
3	1	0	0	1	0	1	Rosette had 4 leaves. Cover ca 5%
4	0	0	0	0	0	0	With Cirsium aridum. Cover ca 10%
5	0	0	0	0	0	0	Cover ca 30%
6	2	2	0	0	0	2	1 rosette & 1 leaf per plant. Cover ca 5%
7	0	0	0	0	0	0	Cover ca 20%
8	0	0	0	0	0	0	With Cirsium aridum. Cover ca 15%
9	1	0	1	0	0	4	Plant has been trampled, appears to be dying.
10	0	0	0	0	0	0	Cover ca 25%
11	1	0	1	0	0	4	Only 1 rosette in flower. Cover ca 25%
12	0	0	0	0	0	0	Cover ca 30%
13	0	0	0	0	0	0	Cover ca 70%, dom. by junegrass & rabbitbrush.
14	0	0	0	0	0	0	Cover ca 35%
15	0	0	0	0	0	0	Cover ca 35%
16	0	0	0	0	0	0	Cover ca 30%
17	0	0	0	0	0	0	Cover ca 30%
18	1	0	0	1	0	3	With Cirsium aridum. Cover ca 40%
19	1	1	0	0	0	1	2 leaves on rosette. Cover ca 25%
20	3	0	1	2	0	13	Fl plant with 6 rosettes & 2 fl stems (incl 5 dead stems from 1993). Cover ca 40%
21	1	0	0	1	0	2	With 1 old fl ste, from 1993. Cover ca 40%.
22	0	0	0	0	0	0	With Cirsium aridum. Cover ca 25%
23	2	0	1	1	0	4	Fl. plant with 2 fl stems. Cover ca 25%
24	0	0	0	0	0	0	With Cirsium aridum. Cover ca 35%

25	0	0	0	0	0	0	Cover ca 55%, mostly dead Artemisia.
26	0	0	0	0	0	0	With Cirsium aridum. Cover ca 15%
27	0	0	0	0	0	0	With Cirsium aridum. Cover ca 20%
28	0	0	0	0	0	0	Plot unusually rocky. Cover ca 15%
29	0	0	0	0	0	0	Plot unusually rocky. Cover ca 30%
30	0	0	0	0	0	0	With Cirsium aridum. Cover ca 30%
31	0	0	0	0	0	0	With Cirsium aridum. Cover ca 25%
32	0	0	0	0	0	0	With Cirsium aridum. Cover ca 25%
33	1	1	0	0	0	1	With Cirsium aridum. Cover ca 20%
34	0	0	0	0	0	0	With Cirsium aridum. Cover ca 25%
35	0	0	0	0	0	0	With Cirsium aridum. Cover ca 20%
36	0	0	0	0	0	0	With Cirsium aridum. Cover ca 20%
37	0	0	0	0	0	0	Cover ca 5%
38	0	0	0	0	0	0	With Cirsium aridum. Cover ca 10%
39	0	0	0	0	0	0	Cover ca 1%
40	0	0	0	0	0	0	Cover ca 5%, very rocky.
Total	16	4	5	7	0	48	

Number of plants per square meter: 0.4

% of plants in flower and fruit: 31.2%

Codes: S = seedling (with one rosette with 2 or fewer leaves); R = reproductive (in flower or fruit); V = vegetative (completely lacking flowering and fruiting heads); D = dead.

Yermo xanthocephalus
Transect # 001

X, Y Coordinates of plants, growth form class, and number of rosettes for each plant per plot.

Date: 26 July 1994
Surveyor: Walter Fertig

Plot 1: (6.3, 1.9) V-5.

Plot 2: (10.0, 6.1) R-7.

Plot 3: (3.8, 8.5) V-1.

Plot 4: None.

Plot 5: None.

Plot 6: (3.7, 10.0) S-1; (4.0, 7.8) S-1.

Plot 7: None.

Plot 8: None.

Plot 9: (8.7, 7.9) R-4.

Plot 10: None.

Plot 11: (9.7, 9.8) R-4.

Plot 12: None.

Plot 13: None.

Plot 14: None.

Plot 15: None.

Plot 16: None.

Plot 17: None.

Plot 18: (5.1, 4.0) V-3.

Plot 19: (9.7, 9.7) S-1.

Plot 20: (2.3, 5.9) R-6; (5.1, 6.5) V-3; (5.8, 1.1) V-4.

Plot 21: (3.4, 0.5) V-2.

Plot 22: None.

Plot 23: (1.7, 7.7) V-1; (5.3, 0.0) R-3

Plot 24: None.

Plot 25: None.

Plot 26: None.

Plot 27: None.

Plot 28: None.

Plot 29: None.

Plot 30: None.

Plot 31: None.

Plot 32: None.

Plot 33: (3.6, 8.4) S-1.

Plot 34: None.

Plot 35: None.

Plot 36: None.

Plot 37: None.

Plot 38: None.

Plot 39: None.

Plot 40: None.

Appendix E.

Slides