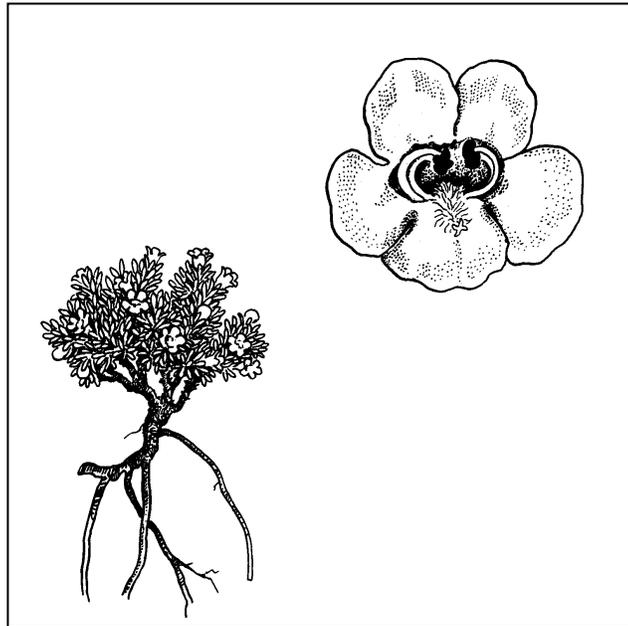


Status of  
Stemless Beardtongue  
(*Penstemon acaulis* var. *acaulis*)  
in Southwest Wyoming



*Penstemon acaulis* var. *acaulis* by Kaye Thorne

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Wyoming State Office

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## ABSTRACT

Stemless beardtongue (*Penstemon acaulis* var. *acaulis*) is a regional endemic restricted to the southern Green River Basin and northern foothills of the Uinta Range in Sweetwater County, Wyoming, and adjacent Daggett County, Utah. This species is restricted to cushion plant/bunchgrass communities within openings in *Artemisia nova* or *A. tridentata* var. *wyomingensis* grasslands on flats or gentle outwash fans of rocky clay or sandy soil. Prior to 2000, *P. acaulis* was known from only 7 main colonies (representing 3 extant occurrences) in Wyoming. Surveys in 2000 documented an additional 14 small colonies on BLM lands east of McKinnon numbering 2770-4220 individuals. The total Wyoming population is currently estimated at less than 10,000 plants in 100 acres of habitat. Two of the Wyoming populations also extend into Utah, where this species appears to be far more abundant. Monitoring studies initiated in 2000 documented population densities of 2.4 plants per square meter in areas of high shrub cover to 7.9-9.3 plants per square meter in sites with low competing cover. Due to the scarcity of baseline data, long-term trends are not known, although at least some colonies have probably declined in historic times due to habitat degradation. Potential threats at present include loss of habitat to gravel quarrying, trampling associated with off-road vehicle recreation and livestock trailing, high recreation use near Flaming Gorge Reservoir, competition from exotic weeds, and pollution. Although considered a Rock Springs BLM "Special Status" plant, Stemless beardtongue habitat is not currently included within existing Special Status Plant Areas of Environmental Concern on BLM lands. Designation of this species as a state BLM Sensitive plant may afford it greater emphasis during land management planning. Continued monitoring is recommended to better assess population trends and response to threats.

## ACKNOWLEDGEMENTS

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## INTRODUCTION

Stemless beardtongue (*Penstemon acaulis* var. *acaulis*) was first discovered by Louis Williams of the Missouri Botanical Garden near McKinnon, Wyoming, in 1932 and was described as a new species in 1934 (Williams 1934). During the next 45 years, this species was observed sporadically in the immediate vicinity of McKinnon and nearby Manila and Antelope, Utah. Due to its apparent rarity, Stemless beardtongue was proposed for listing as Threatened under the Endangered Species Act in 1976 (Ayensu and DeFilipps 1978). Although not listed at that time, the species remained a candidate for listing from 1980-1996 and is currently being considered for state Sensitive status by the Bureau of Land Management (BLM) Wyoming State Office.

Since 1977, only 3 main populations of *Penstemon acaulis* have been found in the state, including one on private lands that has been impacted by gravel quarrying and road construction. Due to concerns about the long-term viability of the plant, the BLM contracted with the University of Wyoming and the Wyoming Natural Diversity Database (WYNDD) in 2000 to conduct field surveys for Stemless beardtongue on public lands in southwestern Wyoming. The following report summarizes the results of this study, and contains information on the biology, distribution, habitat, population size, potential threats, and management needs of *P. acaulis* var. *acaulis* in Wyoming.

## METHODS

Information on the habitat and distribution of *Penstemon acaulis* var. *acaulis* was obtained from scientific literature, specimens from the Rocky Mountain Herbarium (RM), unpublished reports, 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 Laura Welp and Walter Fertig of WYNDD in June 1999 and June 2000 (survey routes are shown in Appendix B). Data on habitat, reproduction, phenology, and associated species were collected using WYNDD plant survey forms. Locations of occurrences were mapped on 7.5 minute USGS topographic maps and digitized as an Arc-View theme. Voucher specimens were collected for deposit at the RM. Information gathered in the field was entered into the computerized Element Occurrence database of WYNDD.

Three permanent demographic monitoring plots were established following the protocol of Lesica (1987). These transects consisted of a single belt 1 meter x 50 meters long, subdivided into 0.5 x 1 meter plots. Within each plot, individual plants were counted and assigned to one of four age classes: seedling, vegetative (non-reproductive), reproductive, and dead. This technique was designed to gauge population density and assess population change over time. Data from these transects are included in Appendix C.

## SPECIES INFORMATION

### Classification

Scientific Name: *Penstemon acaulis* Williams var. *acaulis* (Williams 1934). Holotype:  
USA: Wyoming, Sweetwater County, dry hilltops near McKinnon, 6500 ft., 28 May

1932, *Williams 407* (RM). Isotypes at PH, NY, MO, CAS, and UTC.

Common Name: Stemless beardtongue; Stemless penstemon.

Family: Scrophulariaceae (Figwort family).

Synonyms: None.

Phylogenetic Relationships: The genus *Penstemon* contains nearly 250 species centered primarily in western North America (Cronquist et al. 1984). Stemless beardtongue was initially placed in Section *Caespitosi* by Williams (1934) based on its strongly caespitose growth form and pubescent, linear leaves. Keck (1937) transferred *P. acaulis* and six related taxa to his Subsection *Caespitosi* within Section *Ericopsis*. In 1958, Penland described *P. yampaensis*, (a close relative of *P. acaulis* endemic to northwest Colorado and adjacent Utah), and noted that both taxa were anomalous within the *Caespitosi* group based on their prominently veined leaves, unusual pubescence, and non-plicate corolla throats. Penland suggested that *P. acaulis* and *P. yampaensis* had a stronger affinity with more erect-stemmed beardtongue species in Section *Aurator* (now placed in Section *Cristati*) (Penland 1958; Cronquist et al. 1984). Specimens of *P. acaulis* from the Brown's Park area along the Utah/Colorado border have broader leaves and appear to be morphologically transitional towards *P. yampaensis*, prompting Neese to reclassify *yampaensis* as a variety of *P. acaulis* (Welsh et al. 1993).

Legal Status: *Penstemon acaulis* var. *acaulis* was formerly a Category 2 (C2) candidate for listing under the Endangered Species Act (US Fish and Wildlife Service 1993). The C2 list included species that might have warranted listing as Threatened or Endangered, but for which the USFWS lacked sufficient biological data to support a listing proposal. The C2 program was eliminated by the US Fish and Wildlife Service in 1996 (US Fish and Wildlife Service 1996). Stemless beardtongue is listed as Sensitive in US Forest Service Region 4 (Spahr et al. 1991) and afforded protection within Ashley National Forest in Utah and Wyoming (Atwood et al. 1991). The BLM Wyoming State Office is currently considering this species for possible designation as State Sensitive (Jeff Carroll, personal communication)\*. The BLM's Rock Springs Field Office has listed this species as a "Special Status" plant since 1990 (Weynand and Amidon 1990; Amidon 1994).

Natural Heritage Rank: The Association for Biodiversity Information (formerly the heritage division of The Nature Conservancy) and the network of natural heritage programs gives *Penstemon acaulis* var. *acaulis* a rank of G2, indicating that the taxon is "imperiled because of rarity" rangewide (usually known from 6-20 extant occurrences). This rank does not include var. *yampaensis*, which is ranked G3 and considered more abundant. Stemless beardtongue is ranked S1 because of extreme rarity in Wyoming and Utah (Fertig and Beauvais 1999; Stone 1998).

Description: Stemless beardtongue is an essentially stemless, woody-based perennial forb less than 4 cm tall forming mats up to 30 cm in diameter (Figures 1-2). The leaves are all basal, densely clustered, and have a prominent midrib. Leaf blades are slender and linear, less than 1.6 mm wide

\*No final decision on the State Sensitive list has been made as of 2 February 2001.

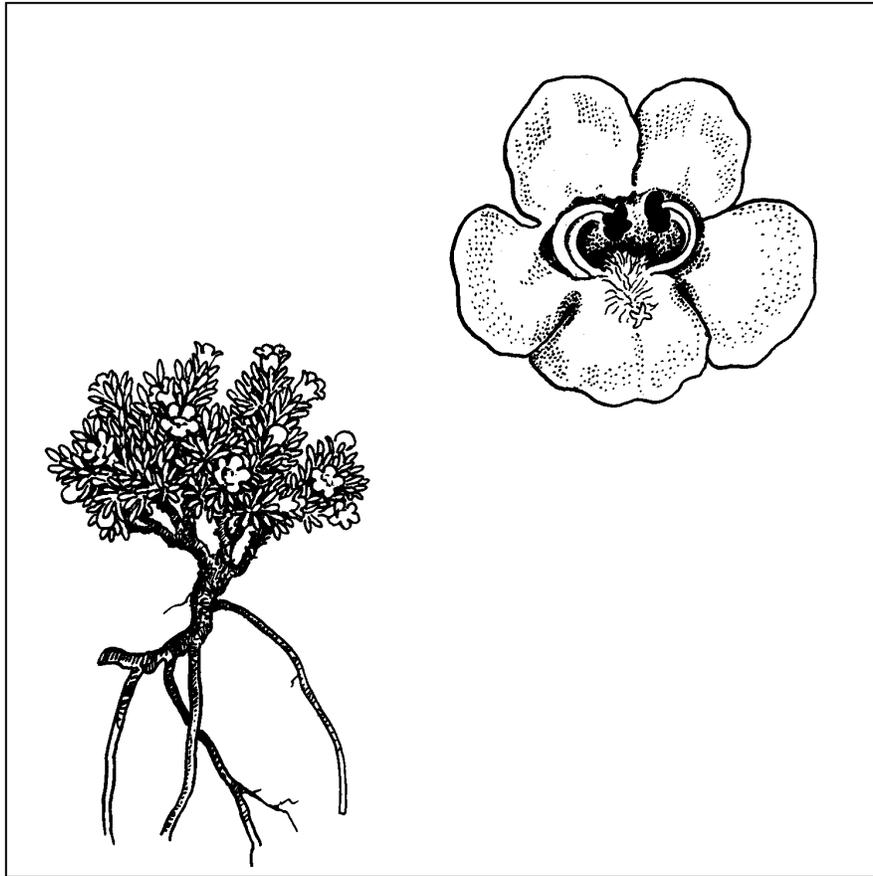


Figure 1. Line drawing of *Penstemon acaulis* var. *acaulis* by Kaye Thorne from Welsh and Thorne (1979).

and 20 mm long and have minutely roughened and viscid surfaces. The bluish-purple, 5-lobed glandular flowers are 12-16 mm long, sessile, occur singly or in pairs, and barely exceed the basal leaves. The calyx is 3.5-4.8 mm long with lance-shaped, scabrous and glandular segments. The sterile filament is yellow and bearded about 2/3 of its length. Anther sacs are glabrous, blue-black, and 0.7-0.9 mm long. Fruits are subglobose capsules ca 2.5 mm long (Cronquist et al. 1984; Clark and Dorn 1979; Dorn and Dorn 1980; Fertig et al. 1994; Welsh et al. 1993; Penland 1958).

Similar Species: *Penstemon caespitosus* has short, erect, leafy stems and short-stalked flowers. *P. acaulis* var. *yampaensis* has linear to oblanceolate leaves, 15-25 mm long x 1.5-2.6 mm wide, corollas 15-18 mm long, and 4 or more flowers per shoot. *P. laricifolius* has erect flowering stems, glabrous white to pink flowers, and glabrous to finely hairy herbage (Cronquist et al. 1984; Dorn 1992; Fertig et al. 1994).

Geographic Range: *Penstemon acaulis* var. *acaulis* is a narrow endemic of the southern Green River Basin and northern foothills of the Uinta Range in Sweetwater County, Wyoming and Daggett County, Utah (Figure 3). Reports from Moffat County, Colorado (Welsh et al. 1993) are probably based on misidentified specimens of var. *yampaensis* (Franklin 1992; Stone 1998).



Figure 2. Photo of *Penstemon acaulis* var. *acaulis* from the vicinity of McKinnon by Mike Evans, 19 June 1999.

Wyoming populations are restricted to three main occurrences (consisting of at least 21 discrete colonies) near the town of McKinnon, the northeast flank of Phil Pico Mountain and adjacent head of Antelope Wash, and the Lucerne Valley Peninsula on the west shore of Flaming Gorge Reservoir (Fertig et al. 1998; Franklin 1992). Extant Utah populations extend from the eastern and southern slopes of Phil Pico Mountain east to the vicinity of Sheep Creek Gap and the west banks of Flaming Gorge near the Lucerne Valley Campground and marina (Franklin 1992). The entire global range of var. *acaulis* is limited to approximately 4300 acres in a 50 square mile area.

The location of Wyoming populations is summarized in Table 1 and more detailed population data are provided for public land sites in Appendix A.

Extent of Surveys in Wyoming: Stemless beardtongue was first discovered by Louis Williams in May 1932 near McKinnon, in southern Sweetwater County, Wyoming (Williams 1934). Reed Rollins located an additional colony "1/2 mile east of McKinnon" in June 1937 and also found the plant 15 miles southwest of Manila, Utah the following year. (E.J. Alexander made the first collection of *P. acaulis* at Antelope, Utah in 1936 [Keck 1937].) The Wyoming population was not revisited until June 1951, when C.L. Porter of the Rocky Mountain Herbarium and Reed Rollins made a collection from "clayey ridges above McKinnon". James Reveal collected the species "0.2 miles east of McKinnon" in June 1971. Robert Dorn and Robert Lichvar surveyed the McKinnon area and relocated populations on private lands along WY Highway 414 and Sweetwater County

Table 1.  
Locations of *Penstemon acaulis* var. *acaulis* in Wyoming

Occurrence # 001 (4 main subpopulations)

County: Sweetwater.

USGS Quad: McKinnon.

Township/Range: T12N R111W

Location: Green River Basin, vicinity of McKinnon.

Occurrence # 008 (1 colony)

County: Sweetwater.

USGS Quad: Manila

Township/Range: T12N R108W S19

Location: Green River Basin, west end of Lucerne Valley Peninsula

Occurrence # 004 (16 colonies in 5 main subpopulations)

County: Sweetwater.

USGS Quads: Antelope Wash, McKinnon, & Phil Pico Mountain.

Township/Range/Section: T12N110W; T12N R111W

Location: Green River Basin/Northern foothills of the Uinta Range

Comments: Includes former EO # 007.

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Highway 1 in June 1977, May 1979, and June 1980. Lichvar discovered a second population on BLM lands 5-6 miles east of McKinnon in June 1980. Jim Locklear of the Nebraska Statewide Arboretum collected specimens and seed from the vicinity of McKinnon in July 1988. M.A. "Ben" Franklin of the Utah Natural Heritage Program discovered two new populations on the northeast toe of Phil Pico Mountain and along the Lucerne Valley Peninsula near Linwood Bay on the Wyoming/Utah border in June 1991. Charmaine Refsdal Delmatier visited the McKinnon site in 1993 to take photos for the *Wyoming Rare Plant Field Guide* and again in 1995 with B.E. Nelson of the Rocky Mountain Herbarium while conducting a general floristic inventory of southwestern Wyoming (Refsdal 1996). Delmatier (2000) also briefly surveyed several colonies near McKinnon and in the vicinity of Wyoming State Highway 414 in 1999. Members of the Wyoming Native Plant Society visited roadside populations near McKinnon in June 1999. Robert Dorn collected

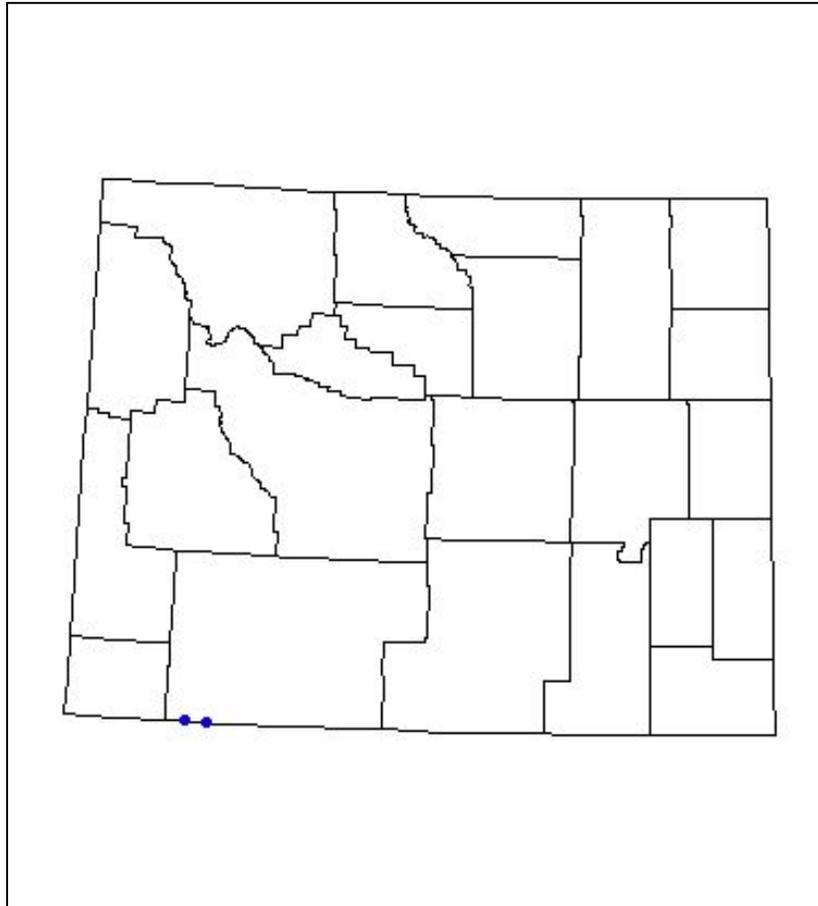


Figure 3. Distribution of *Penstemon acaulis* var. *acaulis* in Wyoming

material near McKinnon in 1999 for a genetic study of the genus *Penstemon* being conducted by researchers at Ohio State University.

Prior to 2000, Stemless beardtongue was known from only 7 main colonies (representing 3-4 extant occurrences) in Wyoming. In June 2000, Laura Welp of WYNDD relocated or discovered 16 discrete colonies in 5 major subpopulations on BLM lands between Phil Pico Mountain and the head of Antelope Wash. The discovery of these new sites essentially links two of the previously recognized occurrences into a single large metapopulation. Welp surveyed other areas of potential habitat near Cottonwood Creek and Linwood Canyon and public and state lands east and north of McKinnon, but discovered no additional populations. Survey routes for the 2000 study are shown in Appendix B.

Habitat: In Wyoming, Stemless beardtongue is found primarily in sparsely vegetated cushion plant/bunchgrass communities in openings within *Artemisia nova* grasslands on low slopes, outwash fans, ridgetops, and flats (Figure 4). These sites are often dominated by *Hymenoxys torreyana*, *Astragalus spatulatus*, *Phlox hoodii*, *Poa secunda*, *Stipa comata*, and *Elymus spicatus*

(Table 2). Less frequently, *Penstemon acaulis* is found within similar openings in *Artemisia tridentata* var. *wyomingensis* or *Chrysothamnus nauseosus* grasslands or on sparsely vegetated roadcuts or roadside ditches within a dense matrix of shrubs. At all sites, the species occurs on shallow, rocky soils derived from the Eocene Bridger Formation. It is usually absent of sparse in areas with deeper soils and dense sagebrush or juniper cover. Elevations range from 6080-8020 feet (1850-2445 m).

Average annual precipitation within the range of *Penstemon acaulis* var. *acaulis* is 10 inches (25 mm), with peak precipitation coming as rain in May and June (Martner 1986). Mean annual temperature is 40° F (4.4° C). January mean high and low temperatures are 32° F (0° C) and 6° F (-14.4° C), respectively. July mean high temperature is 84° F (66.2° C) and July low temperature averages 50° F (10° C). The average number of days at or below freezing in the McKinnon area is 225, while the average number of days exceeding 90° F (32.2° C) is 5-10 (Martner 1986).

Figure 4. Habitat of *Penstemon acaulis* var. *acaulis* in a semi-barren cushion plant/bunchgrass community within a matrix of *Artemisia tridentata* var. *wyomingensis*/*Elymus spicatus* grassland on a low bench of shallow, rocky soil. Tape indicates the end point of Transect # 3, located on a low bench NE of Phil Pico Mountain and WY Highway 414. Photo by Laura Welp, 13 June 2000.

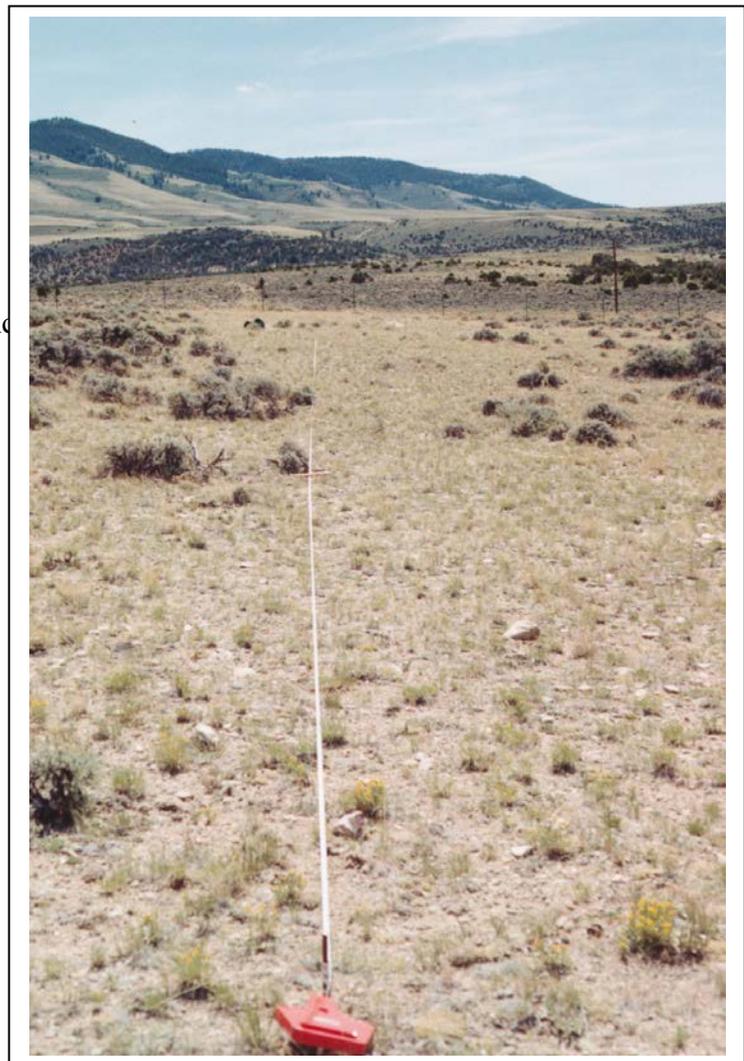


Table 2. Species Commonly Associated with *Penstemon acaulis* var. *acaulis*

Scientific Name	Common Name	Growth Form
<i>Arenaria hookeri</i>	Hooker sandwort	Perennial forb
<i>Artemisia frigida</i>	Fringed sagebrush	Shrub
<i>Artemisia tridentata</i> var. <i>wyomingensis</i>	Wyoming big sagebrush	Shrub
<i>Artemisia nova</i>	Black sagebrush	Shrub
<i>Astragalus jejunus</i> var. <i>jejunus</i>	Starveling milkvetch	Perennial forb
<i>Astragalus spatulatus</i>	Spoonleaf milkvetch	Perennial forb
<i>Castilleja flava</i>	Yellow Indian paintbrush	Perennial forb
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush	Shrub
<i>Chrysothamnus viscidiflorus</i>	Green rabbitbrush	Shrub
<i>Cryptantha caespitosa</i>	Tufted cryptantha	Perennial forb
<i>Draba oligosperma</i>	Few-seeded whitlow-grass	Perennial forb
<i>Elymus spicatus</i>	Bluebunch wheatgrass	Perennial graminoid
<i>Eriogonum brevicaulis</i>	Shortstem buckwheat	Perennial forb
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub
<i>Haplopappus armerioides</i>	Thrift goldenweed	Perennial forb
<i>Haplopappus nuttallii</i>	Nuttall's goldenweed	Perennial forb
<i>Hymenoxys acaulis</i>	Stemless hymenoxys	Perennial forb
<i>Hymenoxys richardsonii</i>	Richardson's hymenoxys	Perennial forb
<i>Hymenoxys torreyana</i>	Torrey's hymenoxys	Perennial forb
<i>Koeleria macrantha</i>	Prairie junegrass	Perennial graminoid
<i>Lesquerella alpina</i>	Alpine bladderpod	Perennial forb
<i>Phlox hoodii</i>	Hood's phlox	Perennial forb
<i>Phlox muscoides</i>	Moss phlox	Perennial forb
<i>Poa secunda</i>	Sandberg bluegrass	Perennial graminoid
<i>Sedum lanceolatum</i>	Lance-leaved stonecrop	Perennial forb
<i>Senecio multilobatus</i>	Basin groundsel	Perennial forb
<i>Stipa comata</i>	Needle-and-thread	Perennial graminoid
<i>Trifolium andinum</i>	Andean clover	Perennial forb

Utah populations are found primarily within *Artemisia nova*-grass-forb communities on silty sand and gravel soils of flats and slopes up to 35° and elevations of 6055-8500 feet (1845-2590 m) (Spahr et al. 1991; Franklin 1992; Stone 1998). Duane Atwood also sampled a population south of Manila from a pinyon-juniper community on rocky-loamy soil.

Population Size and Trends: *Penstemon acaulis* var. *acaulis* is currently known from three extant occurrences in Wyoming, two of which extend across the state line into Utah. The Wyoming population consists of at least 21 small to medium-sized colonies, each covering an area of 0.1-10 acres. Laura Welp counted 1524 plants at the 16 colonies comprising WY Occurrence # 004 in June 2000 and estimated the total population at 2770-4420 individuals (Table 3). Ben Franklin

Table 3.

Demographic Information for Known Populations of *Penstemon acaulis* var. *acaulis* in Wyoming

Occurrence # 001 (4 main subpopulations)  
Area: 80 acres within a 2.5 mile area.  
Number of Plants: Not known. Lichvar estimated 600-800 plants at one subpopulation in 1979. Other visitors to this site have described the populations as “uncommon” to “frequent” (Marriott 1988). Population probably numbers no more than 4000-5000 individuals.  
Density: Not known.  
Evidence of Reproduction: Plants have been observed in flower and fruit from 1933 to 1999.  
Trends: Probably down historically, due to loss of some habitat in a gravel quarry near town. Recent trends are not known.

Occurrence # 004 (16 colonies in 5 main subpopulations)  
Area: 15 acres within a 2 x 4 mile area.  
Number of Plants: Welp counted 1524 plants

in 16 colonies in 2000. The total population is estimated at 2770-4420.  
Density: In 2000, Welp found density to vary from 2.4 plants per square meter in sites with higher shrub cover to 7.9-9.3 plants per square meter in low cover sites.  
Evidence of Reproduction: 5-20% of plants in flower and early fruit in mid June 2000.  
Trends: Long-term trends are not known, although the population has been present since at least 1980.

Occurrence # 008 (1 colony)  
Area: Ca 1 acre in Wyoming (3 acres total, with ca 2/3 in Utah).  
Number of Plants: Population estimated in 1991 at 450-500 plants by Franklin (1992).  
Density: Not known.  
Evidence of Reproduction: Plants in bud and flower on 11 June 1991.  
Trends: Not known. Site has not been revisited since 1991.

(1992) estimated the Lucerne Valley population (2/3 of which falls in Utah) at approximately 450-500 plants in 1991. No current estimates are available for the McKinnon population, although Robert Lichvar documented 600-800 plants at one of three main colonies within the McKinnon occurrence in 1979. At present, the total Wyoming population probably numbers less than 10,000 plants in approximately 100 acres.

Franklin (1992) documented six occurrences of *Penstemon acaulis* var. *acaulis* in northern Utah in 1991, but was unable to relocate three other known sites, including two historical reports that were probably destroyed following the construction of Flaming Gorge Reservoir. The largest Utah population (UT Occurrence # 001) covers an area of 4100 acres on the east and south slopes of Phil Pico Mountain and contains over 100,000 individuals. This population is confluent with WY Occurrence # 004 and extends for at least 5.5 miles from the head of Antelope Wash in Wyoming to Conner Basin in Utah. Other Utah populations are much smaller, covering areas of 3-65 acres and numbering 400-2500 individuals (Franklin 1992). Combined, the Utah and

Wyoming populations consist of several hundred thousand plants in an area of about 4300 acres, of which nearly 96% is restricted to the slopes of Phil Pico Mountain.

In the absence of long-term monitoring and population count data, trends in Wyoming are difficult to determine. Original estimates of 100-200 plants in the state (Dorn and Dorn 1980) do not include larger populations discovered on public lands east of McKinnon in the past 2 decades. Delmatier (2000) suggested that at least some populations near WY Highway 414 might be in decline due to trampling and habitat disturbance. Additional qualitative and semi-quantitative monitoring is needed to determine if population size fluctuates over annual or short time intervals and to assess impacts from known or perceived threats.

Population Biology and Ecology: Stemless beardtongue flowers from mid-May to late June, probably depending on levels of spring precipitation. During the drought year of 2000, only 5-20% of all plants were still in flower by June 11-14. Fruits are produced from mid-June to mid-July.

As in the case of other *Penstemon* species, *P. acaulis* is probably pollinated by visually-oriented insects, such as bees, wasps, butterflies, and flies. Due to its low stature, ground-foraging ants and beetles may also be pollinators. The fruiting capsules of *P. acaulis* are indehiscent and long-persistent. E.J. Alexander observed that seeds remained in the axils of underground branches for several years and were apparently released in situ by the decay of the fruit wall (Keck 1937). Such limited seed dispersal could account for the plants clumped (non-random) distribution pattern.

Populations typically consist of small clusters of 2-20 individuals that may be widely scattered. Monitoring studies initiated in 2000 by Laura Welp documented 7.9-9.3 plants per square meter in areas of low cover, and 2.4 plants per square meter in sites with denser shrub cover. Populations are typically most abundant in areas with diminished shrub and graminoid cover, suggesting that Stemless beardtongue is a poor competitor or adapted to early successional environments.

There is no evidence of hybridization between *Penstemon acaulis* and related taxa in Wyoming. *P. acaulis* var. *yampaensis* populations in the Brown's Park area along the Utah/Colorado border show evidence of introgression with *P. acaulis* var. *acaulis*.

No evidence of herbivory by livestock or other large grazing mammals was observed on Stemless beardtongue plants in 2000. Such herbivory is probably negligible due to the plants short stature (Frankline 1992). Some damage to flowers and fruits by insects and rodents has been observed.

Current Management: In Wyoming, populations of Stemless beardtongue occur on lands managed by the BLM Rock Springs Field Office, Ashley National Forest (Flaming Gorge National Recreation Area), and several private landowners. Currently, all populations on BLM lands occur in areas managed for multiple use, with an emphasis on grazing, recreation, and mineral development. Although considered a "Special Status" plant by the Rock Springs Field Office, *Penstemon acaulis* var. *acaulis* habitat is not included within existing Special Status Plant Areas of Critical Environmental Concern, established in the Green River Resource

Management Plan in 1997 (USDI Bureau of Land Management 1997). BLM populations do fall within designated big game crucial winter range and sage grouse nesting areas and are subjected to seasonal restrictions on off-road motorized recreation and surface occupancy for mineral development. Populations on Ashley National Forest are found on lands managed for multiple use (with an emphasis on recreation). Utah populations occur on state, private, and Ashley National Forest lands (mostly within Flaming Gorge National Recreation Area). Atwood et al. (1991) also report this species from lands managed by the BLM Vernal District, although these populations may represent var. *yampaensis*.

Existing and Potential Threats: Twenty years ago, the primary threat to Wyoming populations of Stemless beardtongue was habitat destruction associated with gravel quarrying on private lands (Clark and Dorn 1979; Dorn and Dorn 1980). Active quarries are not currently present or planned in habitat on public lands. Franklin (1992) identified grazing as a threat on Forest Service lands in the Conner Basin in Utah. Although this species is not actively grazed, trampling by livestock could be a source of mortality. The construction of Flaming Gorge Reservoir probably eliminated two populations in Utah (Franklin 1992) and may have inundated potential habitat in southern Wyoming. Competition with invasive weeds, such as white-top (*Cardaria* sp.) may become a threat at one roadside population on BLM lands in Wyoming. Impacts from off-road vehicle recreation, expansion of existing roads, and habitat degradation from pollution (dumping of agricultural wastes) may be impacting several colonies on private and public lands in Wyoming (Delmatier 2000). Habitat loss and degradation from high recreation use is a threat to several small colonies along the Lucerne Valley Peninsula of Flaming Gorge Reservoir (Franklin 1992). Over-harvest of this species for commercial use as a rock garden ornamental is also a potential threat.

Management Recommendations: The habitat of *Penstemon acaulis* var. *acaulis* currently receives no formal protection on public or private lands, making this species vulnerable to large-scale changes in management, such as increased recreation, increased human population density, or new mineral development within its limited range. Designation of some areas of occupied habitat on BLM lands as a Special Status ACEC, or listing as a state BLM Sensitive species would increase the profile of Stemless beardtongue as a management target. Continued monitoring and periodic visits to known sites (and survey of additional potential habitat in the Linwood Bay area) are needed to assess short-term and long-term population trends, as well as the impacts of potential threats. Due to its large population size, listing of *P. acaulis* as Threatened or Endangered under the Endangered Species Act is probably unwarranted at this time.

## SUMMARY

Stemless beardtongue (*Penstemon acaulis* var. *acaulis*) is a regional endemic restricted to the southern Green River Basin and northern foothills of the Uinta Range in Sweetwater County, Wyoming, and adjacent Daggett County, Utah. This species is restricted to cushion plant/bunchgrass communities within openings in *Artemisia nova* or *A. tridentata* var. *wyomingensis* grasslands on flats or gentle outwash fans of rocky clay or sandy soil. Prior to 2000, *P. acaulis* was known from only 7 main colonies (representing 3 extant occurrences) in Wyoming. Surveys in 2000 documented an additional 14 small colonies on BLM lands east of

McKinnon numbering 2770-4220 individuals. The total Wyoming population is currently estimated at less than 10,000 plants in 100 acres of habitat. Two of the Wyoming populations also extend into Utah, where this species appears to be far more abundant. Monitoring studies initiated in 2000 documented population densities of 2.4 plants per square meter in areas of high shrub cover to 7.9-9.3 plants per square meter in sites with low competing cover. Due to the scarcity of baseline data, long-term trends are not known, although at least some colonies have probably declined in historic times due to habitat degradation. Potential threats at present include loss of habitat to gravel quarrying, trampling associated with off-road vehicle recreation and livestock trailing, high recreation use near Flaming Gorge Reservoir, competition from exotic weeds, and pollution. Although considered a Rock Springs BLM "Special Status" plant, Stemless beardtongue habitat is not currently included within existing Special Status Plant Areas of Environmental Concern on BLM lands. Designation of this species as a state BLM Sensitive plant may afford it greater emphasis during land management planning. Continued monitoring is recommended to better assess population trends and response to threats.

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