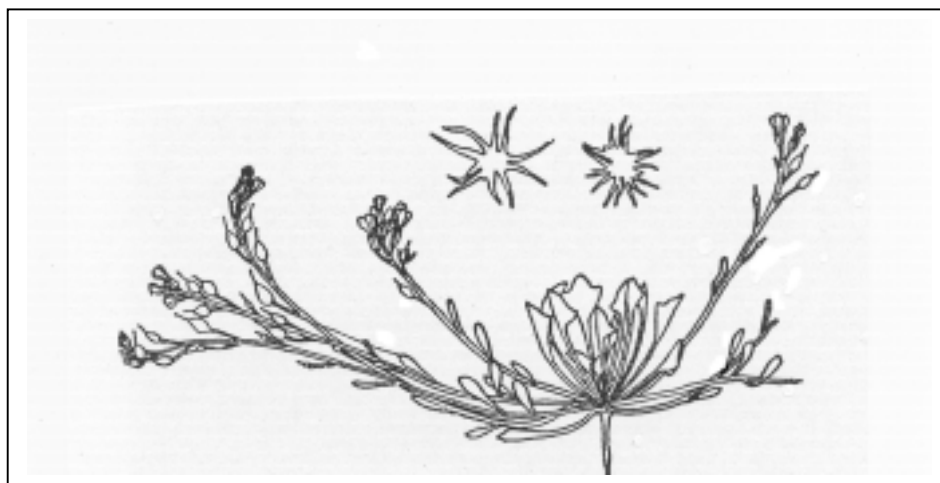


Status of
Prostrate Bladderpod
(*Lesquerella prostrata*)
in Southwest Wyoming



Prepared for the Bureau of Land Management
Wyoming State Office

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5 December 2000

Agreement # K910-A4-0011,
Task Order No. TO-09

Abstract

Lesquerella prostrata is a regional endemic of southwest Wyoming, northeast Utah, and southeast and central Idaho. It is currently known from fewer than 15 locations worldwide, 6 of which are found in the southern Overthrust Belt in Uinta and Lincoln counties, Wyoming. These populations are restricted to dry, sparsely vegetated, desert slopes of whitish or reddish limey clays and soft sandstones of the Green River, Wasatch, and Bridger formations. Wyoming populations contained 4700-11,000 individuals in less than 100 acres of occupied habitat during surveys in 1996 and 1999. Comparable data are lacking for out-of-state populations, although one Idaho population was reported as “locally common” in 2000. Threats have traditionally been low for this species due to its rugged habitat. The recent growth of the natural gas industry in southwest Wyoming makes this species more vulnerable to surface disturbances from road and pipeline construction associated with mineral exploration, as well as from habitat loss from off-road vehicle recreation. Due to its small range and low population numbers, *L. prostrata* should be considered for possible designation as a BLM state sensitive species. Additional surveys are needed in Utah and Idaho before rangewide conservation recommendations can be made.

Acknowledgements

I would like to thank Jill Walford, science teacher at Prep School in Laramie, for her assistance with field surveys and monitoring in 1999. Michael Mancuso of the Idaho Natural Heritage Program and Ben Franklin of the Utah Natural Heritage Program provided information on the status of *Lesquerella prostrata* in their respective states. Rose Lehman of Targhee National Forest, Stuart Markow (independent botanical contractor), and Linda Cook of the University of Idaho kindly provided information on the distribution of this species in Idaho. Jeff Carroll of the BLM Wyoming State Office provided funding and logistic support.

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INTRODUCTION

Prostrate bladderpod (*Lesquerella prostrata*) was first discovered by Aven Nelson near Piedmont, Wyoming on 7 June 1898, and described as a new species the following year (Nelson 1899). During the next 75 years, *L. prostrata* was collected only sparingly in southwest Wyoming, northeast Utah, and central and southeast Idaho (and was often misidentified). Rollins and Shaw (1973) documented only 7 locations for this species across its range in the early 1970s. Despite its apparent rarity, prostrate bladderpod was not a preliminary candidate for listing under the federal Endangered Species Act in the landmark Smithsonian Institution report to Congress in 1975 (Ayensu and DeFillips 1978), nor has it been considered for listing since.

Prior to 1980, *Lesquerella prostrata* was known from only three historical records in Wyoming and was identified as a potential “Endangered species” for the state (Dorn 1977, p. 1397). From 1980-1996, two additional populations were discovered in the state and one historical site was relocated. Due to its rarity, the Bureau of Land Management (BLM) Wyoming State Office contracted with the University of Wyoming and the Wyoming Natural Diversity Database (WYNDD) in 1999 to assemble information on the known distribution, abundance, life history, status, and potential management needs of this species on BLM lands in southwest Wyoming. This information will be used by the BLM to determine if state sensitive designation is necessary for *L. prostrata* at this time.

METHODS

Information on the habitat and distribution of *Lesquerella prostrata* was obtained from WYNDD files and computer databases, specimens from the Rocky Mountain (RM) and University of Idaho herbaria, the New York Botanical Garden internet specimen database, scientific 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 on public lands by Walter Fertig and Gillian Walford of WYNDD in July 1996, June 1997, and June-July 1999 (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 transects were established at WY Occurrence # 002, 004, and 005 following the protocol of Lesica (1987). These transects consisted of a single belt 1 meter x 30 meters long divided into 30 1 x 1 meter plots. Within each plot, individual plants were counted and assigned to one of four classes: flowering, fruiting, vegetative, and dead (Appendix C).

SPECIES INFORMATION

Classification

Scientific Name: *Lesquerella prostrata* A. Nels. (Nelson 1899). Holotype: USA, Uinta

County: Piedmont, 7 June 1898, Nelson 4564 (RM). Isotypes at B, NY, US.

Common Name: Prostrate bladderpod, Rich bladderpod.

Family: Brassicaceae or Cruciferae (Mustard family).

Synonyms: None.

Phylogenetic Relationships: The genus *Lesquerella* contains about 95 species, mostly restricted to North America (Rollins 1993). Thirteen taxa (10 species and 3 varieties) are recognized in Wyoming by Dorn (1992), of which 9 are state or regional endemics.

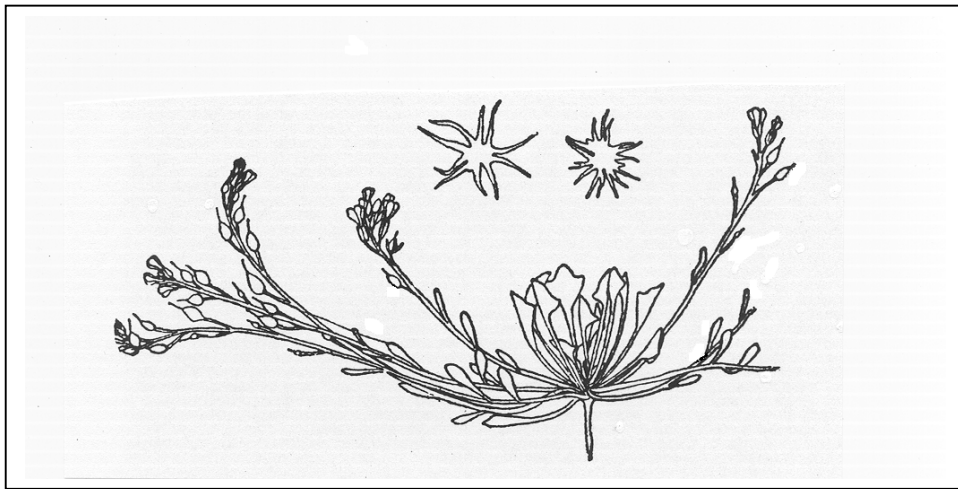
Nelson (1899) suggested that *Lesquerella prostrata* might be related to *L. spatulata*, a species now considered a synonym or variety of *L. alpina*. Payson (1922) allied *L. prostrata* with *L. utahensis* and other species characterized by densely clustered basal leaves, suborbicular to rhombic leaf blades, and pubescent, globose to compressed fruits. Payson recognized that his “*utahensis*” group was taxonomically “perplexing” and suggested that its component species could also be treated as “...races, forms, or varieties of a great polymorphic series” (Payson 1922, pp. 122-123). Maguire (1942) reassessed Payson’s “*utahensis*” group, recognizing *L. multiceps* as a new taxon and revising the species concepts for the other taxa. In Maguire’s view, *L. prostrata* and *L. wardii* represented the segment of the *utahensis* group with elongate and acutish fruit pods, with *prostrata* being the more northerly form and *wardii* restricted to south-central Utah. Maguire (1950) later expanded the concept of *L. prostrata* to include a form with small-styled, recurved fruits from South Pass, Wyoming, which Rollins and Shaw (1973) later described as the new species, *L. fremontii*. Rollins and Shaw (1973) expanded the concept of the “*utahensis*” group to include several recently described taxa with compressed siliques (*L. paysonii* and *L. carinata*), as well as *L. occidentalis*, *L. macrocarpa*, and *L. fremontii*. Of these species, *L. occidentalis* and *L. macrocarpa* are probably most closely related to *L. prostrata* (Rollins and Shaw 1973, p. 228).

Legal Status: *Lesquerella prostrata* has no legal protection at the federal or state level and has not previously been considered for listing under the Endangered Species Act.

Natural Heritage Rank: The Association for Biodiversity Information (formerly the heritage division of The Nature Conservancy) and the network of natural heritage programs gives *Lesquerella prostrata* a rank of G3, indicating that the species is “rare or local throughout its range or found in a restricted range (usually known from 21-100 occurrences)”. Prostrate bladderpod is ranked S1 in Wyoming and Utah, where it is considered “critically imperiled because of extreme rarity (often with fewer than 5 extant occurrences or very few remaining individuals)” (Stone 1998; Fertig and Beauvais 1999). This species is not currently ranked in Idaho (SR or “state reported”).

Description: Prostrate bladderpod is a perennial forb with several prostrate to decumbent stems 6-15 cm long from a sparsely branched caudex (Figs. 1-3). Leaves are densely silvery-pubescent with sessile, forked hairs. The basal leaves are 1-5 cm long, 5-10 mm wide, and have diamond, arrowhead, deltate, or elliptic-shaped leaf blades that taper abruptly to a long petiole. Stem leaves are 0.5-1.5 cm long, linear to oblanceolate, and become sessile above. The inflorescence is an elongated, open raceme of yellow flowers with 4 sepals and 4 petals 7-9 mm long. Fruits are 5-10 mm long, slightly compressed, ovoid to elliptic siliques with styles 3-6 mm long and are borne on S-shaped to erect stalks 5-10 mm long. Fruit walls are densely pubescent on the outside with loose, multi-branched hairs and glabrous to sparsely hairy on the inside. Ovules 2 (occasionally 4) per locule (Dorn 1992; Rollins and Shaw 1973; Rollins 1993).

Figure 1. Line drawing of *Lesquerella prostrata* (with trichomes magnified, above) by E.B. Payson from Payson (1922).



Similar Species: *Lesquerella multiceps* has sparsely pubescent, globose fruits that are not compressed, basal leaves with elliptic to obovate blades 4-12 mm wide that taper gradually to a long petiole, and a multi-branched caudex. *L. alpina* var. *alpina* has linear to narrowly oblanceolate basal leaf blades less than 5 mm wide that are often poorly differentiated from the petiole. *L. alpina* var. *spatulata* has wider outer leaf blades with obovate margins and erect stems over 10 cm long. *L. alpina* var. *condensata* has densely tufted stems with the flowering branches barely (if at all) exceeding the basal leaves and spreading stellate hairs that gives the herbage a shaggy appearance. *L. macrocarpa* and *L. fremontii* have styles under 2 mm long and fruits on recurved stalks. *L. utahensis* has sparsely pubescent, globose fruits with appressed hairs and 4 ovules per locule. *L. garrettii* has basal leaves that gradually taper to a long petiole and caudex branches covered with conspicuous leaf scars and remnant leaf bases. *L. occidentalis* has erect or decumbent stems, elliptic to obovate or heart-shaped basal leaves, and compressed fruits (especially on the margins and apex). *L. wardii* has a short, dense inflorescence, rounded to obovate stem leaves, and 2-8 ovules per locule (Dorn 1992; Rollins and Shaw 1973; Rollins 1993).

Figure 2 . *Lesquerella prostrata* in flower from Meyers Ridge, Uinta County, Wyoming. WYNDD photograph by Walter Fertig, 22 May 1996.



Figure 3. *Lesquerella prostrata* in fruit, ridge 1 mile east of “The Boilers”, Uinta County, Wyoming. WYNDD photograph by Walter Fertig, 5 July 1996.



Geographic Range: Prostrate bladderpod is a regional endemic of southwest Wyoming (Uinta and Lincoln counties) and adjacent northeast Utah (Rich County) and southeast and central Idaho (Bear Lake, Blaine and Custer counties). In Wyoming, *L. prostrata* is restricted to the southern Overthrust Belt from the vicinity of Fossil Butte south to Bridger Butte and the montane foothills near Piedmont and Aspen Mountain (Figure 4, Table 1, Appendix A). Populations in Utah are limited to the Overthrust Belt in southern Rich County (Rollins and Shaw 1973; Stone 1998). Idaho populations occur in the western Overthrust Belt near Alton, the southern Soldier Mountains, and in the Sawtooth Valley near Stanley (Rollins and Shaw 1973; Linda Cook, personal communication; Michael Mancuso, personal communication). Additional reports from the Bloomington Lake area and Franklin Basin in Bear Lake and Franklin counties are apparently based on misidentified specimens of *L. multiceps* (New York Botanical Garden Intermountain Flora database 2000).

Extent of Surveys in Wyoming: No formal surveys were conducted for *Lesquerella prostrata* in Wyoming prior to 1996. Robert Lichvar discovered a new population on Bridger Butte in 1980 while conducting a survey for a different rare plant (*Physaria condensata*). Ernie Nelson and

Figure 4. Distribution of *Lesquerella prostrata* in Wyoming.

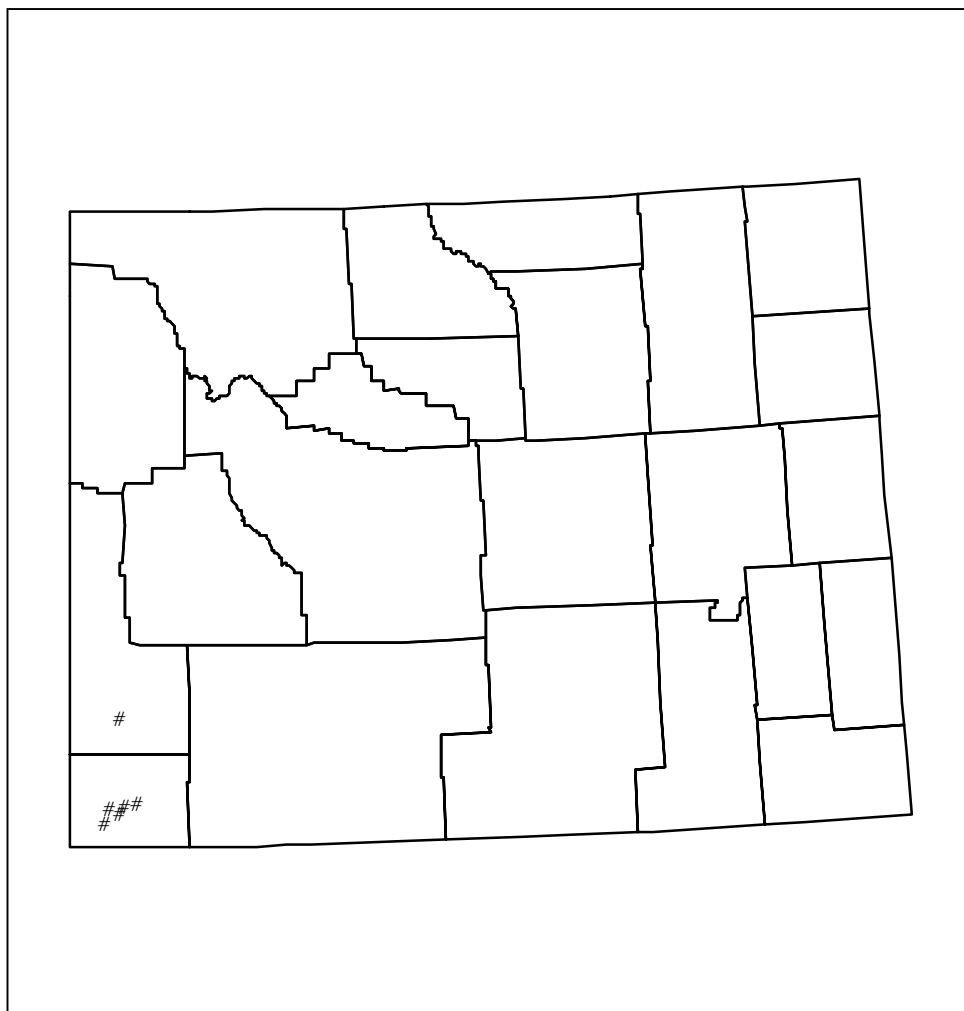


Table 1. Locations of known populations of *Lesquerella prostrata*

I. Wyoming

Occurrence # 001

County: Uinta

USGS Quad: Fort Bridger

Latitude: 411637N

Longitude: 1102853W

Township/Range/Section: T15N R116W S15 (S1/2)

Location: Bridger Basin, summit and south slopes of Bridger Butte, ca 5.5 air miles west-southwest of Fort Bridger, ca 25.5 air miles east of Evanston.

Occurrence # 002

County: Uinta

USGS Quad Name: Piedmont Reservoir

Latitude: 411323N (centrum)

South Latitude: 411303N

North Latitude: 411342N

Longitude: 1103830W (centrum)

East Longitude: 1103826W

West Longitude: 1103835W

Town/Range/Section: T14N R117W S6 (E4 of NE4 & E4 of NE4 of SE4)

Location: Overthrust Belt, north-south trending ridge on divide between Soda Hollow and Piedmont Creek (both tributaries of Muddy Creek), ca 1 mile west of Piedmont and 5 air miles south of Interstate 80, 17 air miles east of Evanston.

Occurrence # 003

County: Lincoln

USGS Quad Name: Fossil

Latitude: 414914N (centrum)

South Latitude: 414910N

North Latitude: 414916N

Longitude: 1103815W (centrum)

East Longitude: 1103803W

West Longitude: 1103836W

Town/Range/Section: T21N R117W S12 (N2 of NE4)

Location: Overthrust Belt, butte on east side of Hay Hollow and on north side of Union Pacific Railroad and US Highway 30, ca 4.5 miles east of Fossil Butte and ca 5-6 air miles northwest of Kemmerer.

Occurrence # 004

County: Uinta

USGS Quad Name: Leroy

Latitude: 411539N (centrum)

South Latitude: 411528N

North Latitude: 411549N

Longitude: 1103537W (centrum)

East Longitude: 1103531W

West Longitude: 1103540W

Town/Range/Section: T15N R117W S22 (W8 of SE4 & E8 of SE4 of SW4)

Location: Overthrust Belt, Meyers Ridge on east side of Muddy Creek, ca 2.5 miles south of Interstate 80, 6 miles west of Cottonwood Creek.

Occurrence # 005

County: Uinta

USGS Quad Names: Piedmont Reservoir, Ragan, Sulphur Creek Reservoir

Latitude: 411503N (centrum)

South Latitude: 411430N

North Latitude: 411636N

Longitude: 1104325W (centrum)

East Longitude: 1104234W

West Longitude: 1104507W

Town/Range/Section: T15N R118W S22 (S2 OF NW4 & N4 OF NE4 OF NW4); 28 (SW4 OF NE4 & SE4SE4 OF SW4); 32 (NW4NW4NW4)

Location: Overthrust Belt, ridge ca 1 mile

east of The Boilers and east of Albert Spring, ca 1.5 miles south of Interstate 80, ca 12.5 air miles east of Evanston and 2.5 miles southeast of junction of Interstate 80 and US Highway 189.

Occurrence # 006

County: Uinta

USGS Quad Name: Sulphur Creek Reservoir

Latitude: 410933N

Longitude: 1104550W

Town/Range/Section: T14N R118W S30 (N4 of SW4 of SE4)

Location: Overthrust Belt, slopes on south side of Aspen Mountain, just north of Aspen Creek and the Aspen Tunnel/Hilliard Road, ca 1.4 miles east of Oyster Shell Ridge, 2.3 miles northeast of Hilliard, and 4 air miles east of WY Highway 150.

II. Utah

Occurrence A

County: Rich

Location: “7 miles southeast of Lake City, toward Randolph” (Rollins and Shaw 1973).

Occurrence B

County: Rich

Location: “4 miles south of Woodruff” (Rollins and Shaw 1973).

Occurrence C

County: Rich

Location: Negro Dan Hollow near Table Mountain (New York Botanical Garden Intermountain Flora specimen database)

Occurrence D

County: Rich

Location: Ca 5 miles west of Sage Valley Junction (New York Botanical Garden Intermountain Flora specimen database)

III. Idaho

Occurrence A.

County: Bear Lake

Location: “East of Alton” (Rollins and Shaw 1973).

Occurrence B.

County: Blaine (or Camas?)

Location: “South end of Soldier Mountains” (Rollins and Shaw 1973).

Occurrence C.

County: Custer

Location: “1 mile east of Stanley”, “Stanley Creek Road, 6.5 miles northwest of Stanley” and “Stanley Creek Road, 1.7 miles north of state highway 21” (All in the Sawtooth Valley in the vicinity of Stanley according to Michael Mancuso, Idaho Conservation Data Center).

Charmaine Refsdal Delmatier relocated this population and discovered one additional location during a general floristic survey of southwest Wyoming in 1994-95 (Refsdal 1996). From 1996-1999, Walter Fertig and Gillian Walford of WYNDD surveyed BLM and state lands in the southern Overthrust Belt for this species and discovered one new population and relocated 3 historical reports (see Appendix C for survey routes). Additional unsurveyed habitat occurs on land-locked BLM sections and private lands in the vicinity of Ragan, Piedmont, Altamont, Leroy, Bridger, Fossil, and the Bear River Divide. Potential habitat on BLM lands is shown in Appendix C.

Habitat: Across its range, *Lesquerella prostrata* is reported from dry hillsides, windswept knolls, and steep slopes of shale or whitish sand with a surface of small rocks (Rollins 1993). Wyoming populations are most abundant on west to south or southeast-facing slopes and rims of whitish to reddish or gray dry limey clays and soft sandstones with a surface layer of fine gravel at elevations of 7200-7700 feet (2195-2350 m) (Figures 5-6). These sites are primarily entisols or aridisols derived from the Eocene Green River (Laney Member) or Wasatch formations (Love and Christiansen 1985). Populations in the southern Overthrust Belt and Bridger Butte are found on soils derived from the Lower Cretaceous Aspen Shale and Eocene Bridger Formation. Most of these sites are dominated by sparse cushion plants, bunchgrasses, and low shrubs with a total,

Figure 5. Habitat of *Lesquerella prostrata* on slopes of Meyers Ridge, Uinta County, Wyoming. Plants occur on reddish-gray clay shale below sandstone slopes on outcrops of the Laney Member of the Green River Formation amid cushion plants and scattered Utah junipers. WYNDD photograph by Walter Fertig, 22 May 1996.





Figure 6. Habitat of *Lesquerella prostrata* in the vicinity of “The Boilers” south of Interstate 80 in Uinta County, Wyoming. Plants occur in sparsely vegetated openings amid Wyoming big sagebrush and Green rabbitbrush on multicolored outcrops of reddish and white sandstones and shales of the Wasatch Formation. WYNDD photograph by Gillian Walford, 29 July 1999.

vegetative cover of 10-25%. Common associated species include *Eriogonum brevicaulle* var. *laxifolium*, *Chaenactis douglasii*, *Cryptantha caespitosa*, *Physaria condensata*, *Arenaria hookeri*, *Poa secunda*, *Elymus spicatus*, *Oryzopsis hymenoides*, *Artemisia tridentata* var. *wyomingensis*, and *Chrysothamnus viscidiflorus* (Table 2). At least one Wyoming population is also found on northwest-facing reddish-gray rocky clay-shale slopes in *Juniperus osteosperma* woodlands with an open understory of *Artemisia tridentata* and *Poa secunda*. Prostrate bladderpod is present, but uncommon, in sandy-gravelly openings within *Artemisia tridentata* var. *wyomingensis*-*Chrysothamnus viscidiflorus* shrub communities with 50% vegetative cover at the toe of steep slopes. Average annual precipitation within the range of *Lesquerella prostrata* in Wyoming varies from 10-12 inches (25-30 mm), with peak precipitation coming as rain in April and May (Martner 1986). Mean annual temperature is 38 - 40° F (3.3 - 4.4° C). January mean high and low temperatures are 28 - 32° F (-2.2 - 0° C) and 4 - 8° F (-15.5 - -13.3° C), respectively. July mean high temperature ranges from 80 - 82° F (26.7 - 27.8° C) and July low temperature averages 42 - 46° F (5.5 - 7.7° C) (Martner 1986).

Table 2. Species Commonly Associated with *Lesquerella prostrata* in Wyoming

Scientific Name	Common Name	Growth form
<i>Amelanchier utahensis</i>	Utah serviceberry	Shrub
<i>Arenaria hookeri</i>	Hooker's sandwort	Perennial Forb
<i>Artemisia tridentata</i> var. <i>wyomingensis</i>	Wyoming big sagebrush	Shrub
<i>Astragalus jejunus</i> var. <i>jejunus</i>	Starveling milkvetch	Perennial Forb
<i>Astragalus spatulatus</i>	Spoonleaf milkvetch	Perennial Forb
<i>Astragalus vexilliflexus</i>	Bent-flower milkvetch	Perennial Forb
<i>Chaenactis douglasii</i>	Hoary dustymaiden	Perennial Forb
<i>Chrysothamnus viscidiflorus</i>	Green rabbitbrush	Shrub
<i>Cryptantha caespitosa</i>	Tufted cryptantha	Perennial Forb
<i>Elymus spicatus</i>	Bluebunch wheatgrass	Perennial Graminoid
<i>Eriogonum brevicaulle</i> var. <i>laxifolium</i>	Shortstem buckwheat	Perennial Forb
<i>Haplopappus acaulis</i>	Stemless goldenweed	Perennial Forb
<i>Ipomopsis congesta</i>	Ballhead gilia	Perennial Forb
<i>Ipomopsis spicata</i>	Spicate gilia	Perennial Forb
<i>Juniperus osteosperma</i>	Utah juniper	Shrub/Tree
<i>Oryzopsis hymenoides</i>	Indian ricegrass	Perennial Graminoid
<i>Oxytropis sericea</i>	White locoweed	Perennial Forb
<i>Phlox hoodii</i>	Hood's phlox	Perennial Forb
<i>Physaria condensata</i>	Tufted twinpod	Perennial Forb
<i>Poa secunda</i>	Sandberg bluegrass	Perennial Graminoid
<i>Senecio canus</i>	Woolly groundsel	Perennial Forb

Population Size and Trends: Based on 1999 census data from five of the state's six known occurrences, the total population of *Lesquerella prostrata* in Wyoming is currently estimated at 4,700-11,000 plants. Individual populations range in size from 10-100 plants to nearly 5000 in patches of 1-50 acres (Table 3). The entire state population covers an area of less than 100 acres. Quantitative trend data are not available for any sites, although at least two populations have been essentially stable from 1995-1999.

The current abundance of *Lesquerella prostrata* is poorly known elsewhere in its range. Michael Mancuso of the Idaho Conservation Data Center reported this species as "locally common" near Stanley, Idaho in July 2000, where it co-occurs with another endemic mustard, *Draba trichocarpa* (M. Mancuso, personal communication). No other Idaho populations have been revisited in recent years. Stone (1998) reports no recent population data from occurrences in Utah.

Population Biology and Ecology: Wyoming populations of Prostrate bladderpod occur at densities of 1.4 to 12.7 plants per square meter, based on 1999 demographic monitoring data (Appendix C). Density may depend on habitat suitability, with higher densities occurring at sites with less competing vegetation. Plants typically occur in small, non-random clusters, perhaps reflecting patchy dispersal or the significance of microsite conditions for germination. In 1999, reproductive plants accounted for 50-90% of all individuals in surveyed populations and seedlings or young (small and few-leaved) vegetative plants represented 25-30% of the total. Density of reproductive plants ranged from 1.2-6.5 plants per square meter. Nearly 50% of reproductive plants at one site were smaller than average in 1999, perhaps reflecting early flowering due to moist spring conditions.

Flowering occurs from mid April to late June, depending on spring moisture conditions. Fruiting plants have been observed from early June to early July. Pollination biology is poorly understood for this species, although small flies and bees have been observed near the flowers. Seed dispersal is mostly by gravity or wind, although the seeds have no wings or other structures to promote dispersal. Dried, bladderly fruit pods may facilitate dispersal and help account for the clumped distribution pattern of the species. It is not known whether a persistent seed bank is maintained.

Rollins and Shaw (1973, p. 225) report potential hybrids between *Lesquerella prostrata* and *L. occidentalis* in Blaine and Custer counties, Idaho. No comparable hybrid clusters have been observed in Wyoming.

No evidence of herbivory was observed at Wyoming sites in 1996 or 1999. This species is probably not readily grazed by livestock or native wildlife, although insects may prey upon fruits and seeds.

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

Current Management: All known Wyoming populations of *Lesquerella prostrata* are found on public lands managed by the BLM Kemmerer Field Office for multiple use. Potential habitat could occur in Fossil Butte National Monument, although no populations have been documented there in recent surveys (Fertig 2000).

Table 3.
Demographic information for known populations of *Lesquerella prostrata* in Wyoming

<p>Occurrence # 001 <u>Area</u>: Not reported. <u>Number of Plants</u>: Not known. <u>Density</u>: Not known. <u>Evidence of Reproduction</u>: Plants observed in flower or fruit in June 1980, April 1981, June 1981, and July 1995. <u>Evidence of Expansion/Contraction</u>: Not known.</p>	<p><u>Number of Plants</u>: Population estimated at 2000-2500 plants by G. Walford in 1999. <u>Density</u>: 4.73 plants per square meter in monitoring plot. <u>Evidence of Reproduction</u>: Plants in flower or fruit in May 1996 and June 1999. <u>Evidence of Expansion/Contraction</u>: Population has been known since at least 1996. An obscure 1930s report by Reed Rollins may be from this location.</p>
<p>Occurrence # 002 <u>Area</u>: 50 acres. <u>Number of Plants</u>: Population estimated at 1000-5000 plants by G. Walford in 1999. <u>Density</u>: 1.43 plants per square meter in monitoring plot. <u>Evidence of Reproduction</u>: 37 reproductive and 3 seedling plants observed in monitoring plot by G. Walford. <u>Evidence of Expansion/Contraction</u>: Population has been known since 1898 and is still extant.</p>	<p>Occurrence # 005 <u>Area</u>: 20 acres. <u>Number of Plants</u>: Population estimated at 1600-2400 plants in surveys of 4 main sites from 1996-1999. <u>Density</u>: 12.7 plants per square meter observed in monitoring plot by G. Walford in 1999. <u>Evidence of Reproduction</u>: Plants in flower or fruit in June 1995, May 1996, July 1996, and June-July 1999. <u>Evidence of Expansion/Contraction</u>: Population has been relatively stable since 1995.</p>
<p>Occurrence # 003 <u>Area</u>: 3-5 acres. <u>Number of Plants</u>: Population estimated at 100-1000 plants by G. Walford in 1999. <u>Density</u>: Sparsely distributed. <u>Evidence of Reproduction</u>: Plants in fruit in July 1999. <u>Evidence of Expansion/Contraction</u>: population has been known since 1946.</p>	<p>Occurrence # 006 <u>Area</u>: 1 acre <u>Number of Plants</u>: 10-100 plants observed in brief survey by G. Walford in 1999. <u>Density</u>: Plants scattered. <u>Evidence of Reproduction</u>: Plants in fruit in July 1999. <u>Evidence of Expansion/Contraction</u>: Not known.</p>
<p>Occurrence # 004 <u>Area</u>: 5-10 acres.</p>	

Existing and Potential Threats: Historically, threats to *Lesquerella prostrata* have been relatively low in Wyoming due to the plant's rugged habitat. With the recent growth of the natural gas industry in southwest Wyoming, more habitat may become vulnerable to mineral exploration and development, especially from increased road and pipeline construction (Fertig et al. 1998). Surface disturbances associated with construction of communications lines along the Interstate 80 corridor could also be a threat at some sites. Habitat degradation (erosion, soil compaction, trampling) from off-road vehicle recreation could become a more serious threat on public land sites in southwest Wyoming. Competition from invasive weed species may also become a greater threat. Impacts from livestock grazing appear low due to the plant's small stature, inedibility, and preference for dry, rocky slopes with low forage and no water.

Management Recommendations: Prostrate bladderpod currently receives no formal protection in Wyoming and occurs entirely on public lands managed for multiple use. Many populations are probably naturally protected from surface disturbances due to their presence on steep slopes or unstable soils that are unsuitable for well siting or pipeline and road construction. Such populations, however, are not protected from the impacts of off-road vehicle recreation. Current BLM land management plans within the range of *L. prostrata* should be amended to recognize the management needs of this plant and its habitat during industrial development. Occupied habitat should be avoided during industrial development and probable habitat should be surveyed prior to new construction.

The BLM Wyoming State Office is currently considering *L. prostrata* for possible listing as a state sensitive species. More information is needed on the current status of this species in Idaho and Utah before range-wide status recommendations can be made.

SUMMARY

Lesquerella prostrata is a regional endemic of southwest Wyoming, northeast Utah, and southeast and central Idaho. It is currently known from fewer than 15 locations worldwide, 6 of which are found in the southern Overthrust Belt in Uinta and Lincoln counties, Wyoming. These populations are restricted to dry, sparsely vegetated, desert slopes of whitish or reddish limey clays and soft sandstones of the Green River, Wasatch, and Bridger formations. Wyoming populations contained 4700-11,000 individuals in less than 100 acres of occupied habitat during surveys in 1996 and 1999. Comparable data are lacking for out-of-state populations, although one Idaho population was reported as "locally common" in 2000. Threats have traditionally been low for this species due to its rugged habitat. The recent growth of the natural gas industry in southwest Wyoming makes this species more vulnerable to surface disturbances from road and pipeline construction associated with mineral exploration, as well as from habitat loss from off-road vehicle recreation. Due to its small range and low population numbers, *L. prostrata* should be considered for possible designation as a BLM state sensitive species. Additional surveys are needed in Utah and Idaho before rangewide conservation recommendations can be made.

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Service, and US Forest Service Region 4 by the University of Wyoming, Rocky Mountain Herbarium, Laramie, WY.

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Rollins, R.C. and E.A. Shaw. 1973. The genus *Lesquerella* (Cruciferae) in North America. Harvard Univ. Press, Cambridge, MA.

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Appendix A.
Element Occurrence Records and Location Maps

WYOMING NATURAL DIVERSITY
DATABASE
-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD
Occurrence # 001

Status

Data Sensitive?: No
Identification verified: Yes
TNC Global Rank: G3
WYNDD State Rank: S1
Federal Status: None
WY Distribution Note: Regional endemic

Location

County: Uinta
USGS Quad Name: Fort Bridger
Latitude: 411637N
Longitude: 1102853W
Map Accuracy: Medium; location is within
an approximately 1.5 mi radius from point
on USGS topo map.
Town/Range/Section: T15N R116W S15
(S1/2)
Location: Bridger Basin, summit and south
slopes of Bridger Butte, ca 5.5 air miles
west-southwest of Fort Bridger, ca 25.5 air
miles east of Evanston.

Population Data

Last Observed: 1995-07-07
First Observed: 1980-06-04
Data: 1995-07-07: Observed in fruit by
Nelson and Refsdal.

1981-06-26: Observed in flower and early
fruit by Lichvar. With *Hymenoxys* and

Castilleja.

1981-04-17: Observed in flower by Lichvar.
With *Artemisia* and *Juniperus*.

1980-06-04: Observed in flower and fruit by
R. Lichvar with *Juniperus* and *Astragalus*.

Habitat

Habitat: South-facing rocky clay slopes and
sagebrush flats on summit of butte on soft
soils covered by fine gravel derived from
the Bridger Formation.
Elevation: 7200-7400 feet
Size: not reported.

Managed Area: BLM Kemmerer Field Office

Documentation

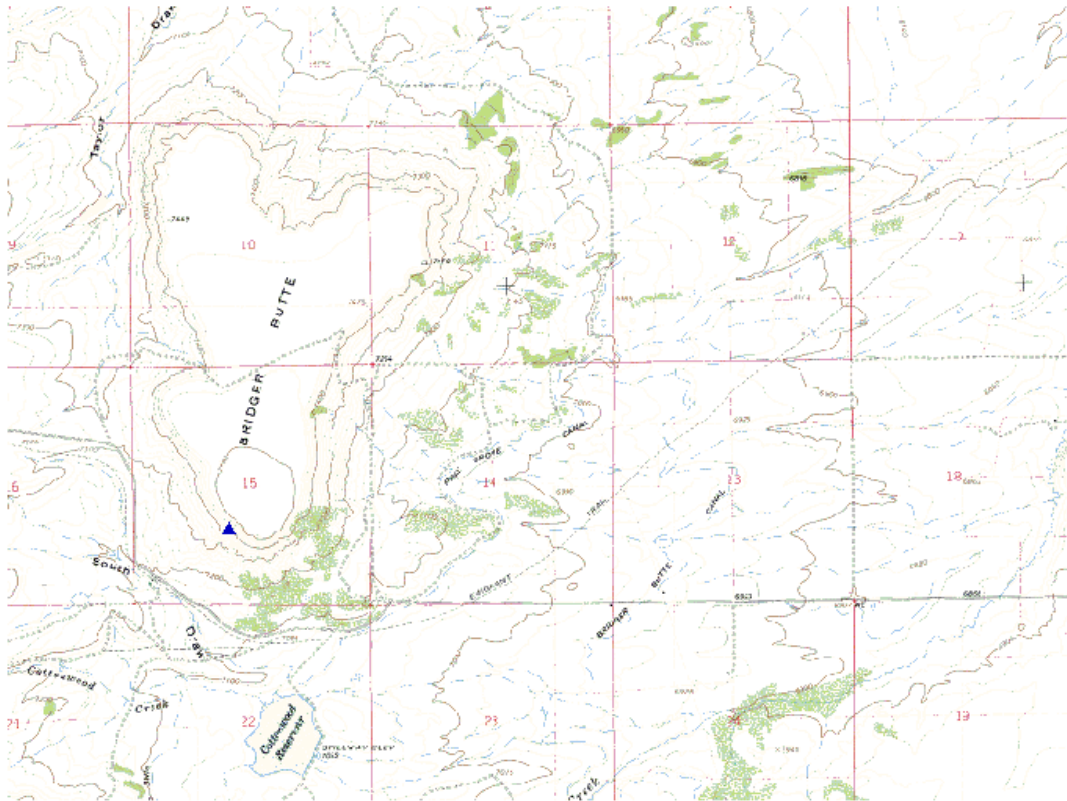
Specimens: Lichvar, R.W. (2774). 1980. NY;
(3938, 4202). 1981. RM.
Nelson, B.E. (36450). 1995. RM.

Sources:

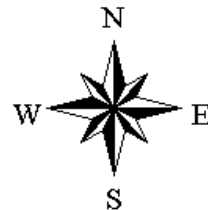
Refsdal, C.H. 1996. A general floristic
inventory of southwest Wyoming and
adjacent northeast Utah, 1994-1995.
Unpublished report prepared for the Bureau
of Land Management Wyoming State
Office, Bureau of Land Management Vernal
Supervisor's Office, US Fish and Wildlife
Service, and US Forest Service Region 4 by
the University of Wyoming, Rocky
Mountain Herbarium, Laramie, WY.

Author: Walter Fertig
Edition Date: 00-06-15

Lesquerella prostrata Occurrence # 001
Fort Bridger Quad
T15N R116W S15 (S1/2)



▲ *Lesquerella prostrata*



WYOMING NATURAL DIVERSITY
DATABASE

-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD

Number: 002

Status

Data Sensitive?: No

Identification verified: Yes

TNC Global Rank: G3

WYNDD State Rank: S1

Federal Status: None

WY Distribution Note: Regional endemic

Location

County: Uinta

USGS Quad Name: Piedmont Reservoir

Latitude: 411323N (centrum)

South Latitude: 411303N

North Latitude: 411342N

Longitude: 1103830W (centrum)

East Longitude: 1103826W

West Longitude: 1103835W

Map Accuracy: Precise; location is within a 75 foot radius of point on USGS topo map.

Town/Range/Section: T14N R117W S6 (E4 of NE4 & E4 of NE4 of SE4)

Location: Overthrust Belt, north-south trending ridge on divide between Soda Hollow and Piedmont Creek (both tributaries of Muddy Creek), ca 1 mile west of Piedmont and 5 air miles south of Interstate 80, 17 air miles east of Evanston.

Population Data

Last Observed: 1999-06-30

First Observed: 1898-06-07

Occurrence Rank: AB

Rank Comments: Population locally abundant and widely distributed; habitat in good condition, although bisected by a two-track; threats low to moderate from grazing and off-road vehicle recreation.

Data: 1999-06-30: Population size estimated at 1000-5000 plants by Jill Walford. Ca 90% of the population in fruit and 10% in vegetative condition. 43 plants (3 seedlings, 2 vegetative, 37 fruiting, and 1 dead plant observed in 1 x 30 meter monitoring transect (density 1.43 plants/square meter). Occurs with *Poa secunda*, *Haplopappus acaulis*, *Arenaria hookeri*, *Senecio canus*, *Chrysothamnus nauseosus* and *Physaria condensata*.

1898-06-07: reported as "not plentiful" by A. Nelson.

Habitat

Habitat: Cushion plant-*Poa secunda* community with scattered *Artemisia tridentata* var. *wyomingensis* and *Chrysothamnus viscidiflorus* on west to south-facing slope of dry limestone clay/gravel derived from the Laney Member of the Green River Shale. May also occur on lower slopes with denser cover of sagebrush and *Poa secunda*.

Elevation: 7240-7440 feet

Size: 50 acres

Comments: This occurrence probably includes Nelson's 1898 type locality of "Piedmont".

Managed Area: BLM Kemmerer Field Office

Documentation

Specimens: Nelson, A. (4564). 1898. RM Holotype, B, NY, US.

Walford, G. (3004, 3006, 3007). 1999. RM.

Sources:

Nelson, A. 1899. New plants from Wyoming VI. Bulletin of Torrey Botanical Club 26: 122-134.

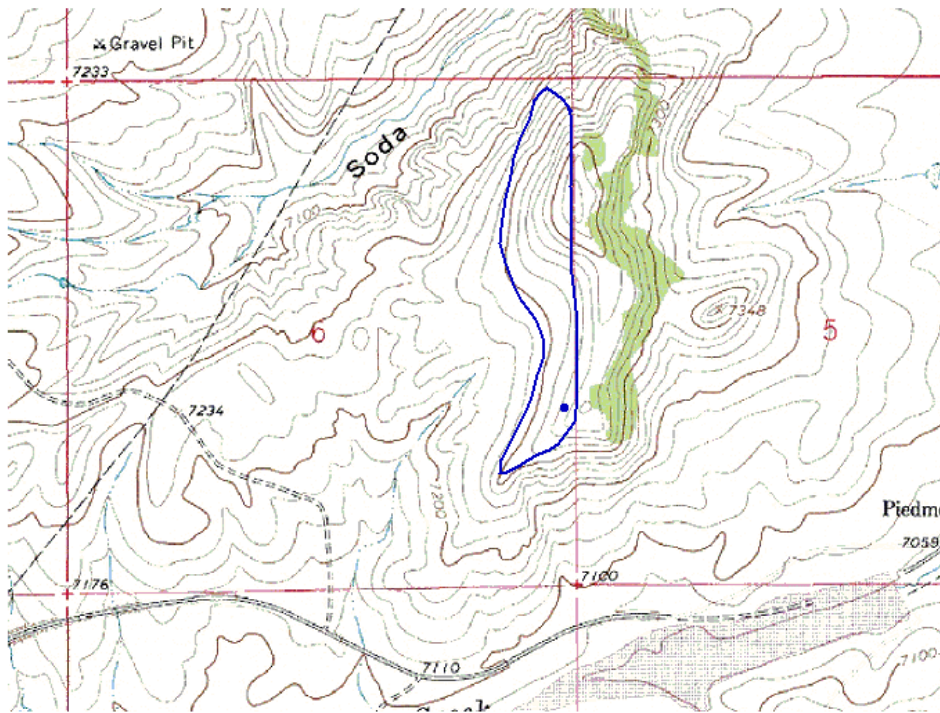
Payson, E.B. 1922. A monograph of the genus *Lesquerella*. Annals Missouri

Botanical Garden 8:103-236.
Rollins, R.C., and Shaw, E.A. 1973. The
Genus *Lesquerella* (Cruciferae) in North
America. Harvard Univ. Press, Cambridge,

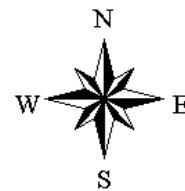
MA.

Author: Walter Fertig
Edition Date: 00-06-16

Lesquerella prostrata Occurrence # 002 Piedmont Reservoir Quad T14N R117W S6 (E4)



- *Lesquerella prostrata* Transect # 2
- *Lesquerella prostrata*



WYOMING NATURAL DIVERSITY
DATABASE

-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD

Number: 003

Status

Data Sensitive?: No

Identification verified: Yes

TNC Global Rank: G3

WYNDD State Rank: S1

Federal Status: None

WY Distribution Note: Regional endemic

Location

County: Lincoln

USGS Quad Name: Fossil

Latitude: 414914N (centrum)

South Latitude: 414910N

North Latitude: 414916N

Longitude: 1103815W (centrum)

East Longitude: 1103803W

West Longitude: 1103836W

Map Accuracy: Precise; location is within a
75 foot radius of point on USGS topo map.

Town/Range/Section: T21N R117W S12
(N2 of NE4)

Location: Overthrust Belt, butte on east side
of Hay Hollow and on north side of Union
Pacific Railroad and US Highway 30, ca 4.5
miles east of Fossil Butte and ca 5-6 air
miles northwest of Kemmerer.

Population Data

Last Observed: 1999-07-01

First Observed: 1946-06-10

Occurrence Rank: B

Rank Comments: Population sparse, habitat
in good condition, but may be impacted by
recreational activities and grazing.

Data: 1999-07-01: Population estimated at

100-1000 by Jill Walford. Plants entirely in
fruit. Co-occurs with *Physaria condensata*,
but much more difficult to observe. Also
occurs with *Eriogonum brevicaule* var.
laxifolium, *Arenaria hookeri*, and
Chaenactis douglasii.

1946-06-10: Observed in late flower and fruit
by Ripley and Barneby.

Habitat

Habitat: *Artemisia tridentata* var.

wyomingensis low shrub community with
scattered bunchgrasses (*Poa secunda*,
Oryzopsis hymenoides, and *Elymus*
spicatus) and cushion plants on SE-facing
dry, whitish limestone clay slopes with
gravel on surface. Substrate derived from
the Green River and Wasatch formations.

Elevation: 7280-7300 feet

Size: 3-5 acres

Comments: This occurrence includes a
vague, historical collection by Ripley and
Barneby from "6 miles west of Kemmerer".
Additional habitat may occur on ridges
directly south of US Highway 30.

Managed Area: BLM Kemmerer Field Office

Documentation

Specimens: Ripley and Barneby (7879).

1946. (CAS, NY).

Walford, J. (3010). 1999. RM.

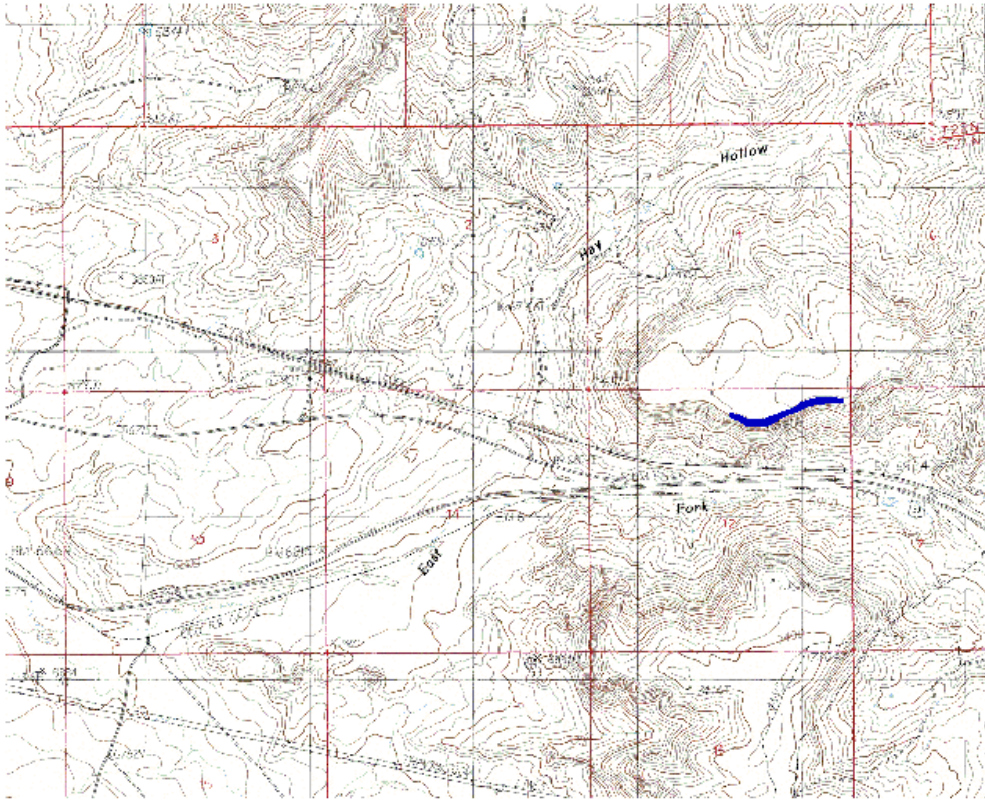
Sources:

Rollins, R.C., and Shaw, E.A. 1973. The
Genus *Lesquerella* (Cruciferae) in North
America. Harvard Univ. Press, Cambridge,
MA.

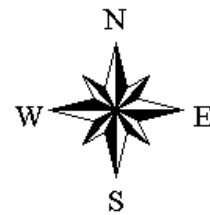
Author: Walter Fertig

Edition Date: 00-06-16

Lesquerella prostrata Occurrence # 003
Fossil Quad
T21N R117W S12 (N2 of NE4)



 **Lesquerella prostrata**



WYOMING NATURAL DIVERSITY
DATABASE

-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD
Number: 004

Status

Data Sensitive?: No
Identification verified: Yes
TNC Global Rank: G3
WYNDD State Rank: S1
Federal Status: None
WY Distribution Note: Regional endemic

Location

County: Uinta
USGS Quad Name: Leroy
Latitude: 411539N (centrum)
South Latitude: 411528N
North Latitude: 411549N
Longitude: 1103537W (centrum)
East Longitude: 1103531W
West Longitude: 1103540W
Map Accuracy: Precise; location is within a
75 foot radius of point on USGS topo map.
Town/Range/Section: T15N R117W S22
(W8 of SE4 & E8 of SE4 of SW4)
Location: Overthrust Belt, Meyers Ridge on
east side of Muddy Creek, ca 2.5 miles
south of Interstate 80, 6 miles west of
Cottonwood Creek.

Population Data

Last Observed: 1999-06-30
First Observed: 1996-05-22
Occurrence Rank: AB
Rank Comments: Population locally
abundant; habitat undisturbed; threats low.
Data: 1999-06-30: Population estimated at
2000-2500 based on sampling by Jill
Walford. 142 plants observed in 1 x 30
meter monitoring plot, with 70% in fruit
and 30% as seedlings or in vegetative

condition. Density within plot 4.73 per
square meter. Occurs with *Juniperus*
osteosperma, *Chrysothamnus viscidiflorus*,
and *Oryzopsis hymenoides*.

1996-05-22: In flower and fruit. Locally
abundant (population estimated in low
hundreds in small area of survey by W.
Fertig). Occurs with *Cryptantha caespitosa*
and *Ipomopsis congesta*.

Habitat

Habitat: Open *Juniperus osteosperma*
woodland with *Artemisia tridentata* and
Poa secunda understory on northwest-
facing reddish-gray clay-shale slopes
covered by rock, gravel, and silt below
caprock of white, limey sandstone slabs.
Substrate derived from the Laney Member
of the Green River Shale.
Elevation: 7300-7400 feet
Size: 5-10 acres

Comments: This site is in the vicinity of
Rollins' general location "dry hillside near
Big Muddy Creek between Fort Bridger and
Evanston" cited in Rollins and Shaw
(1973). Walford established a demographic
monitoring plot at this site in 1999.

Managed Area: BLM Kemmerer Field Office

Documentation

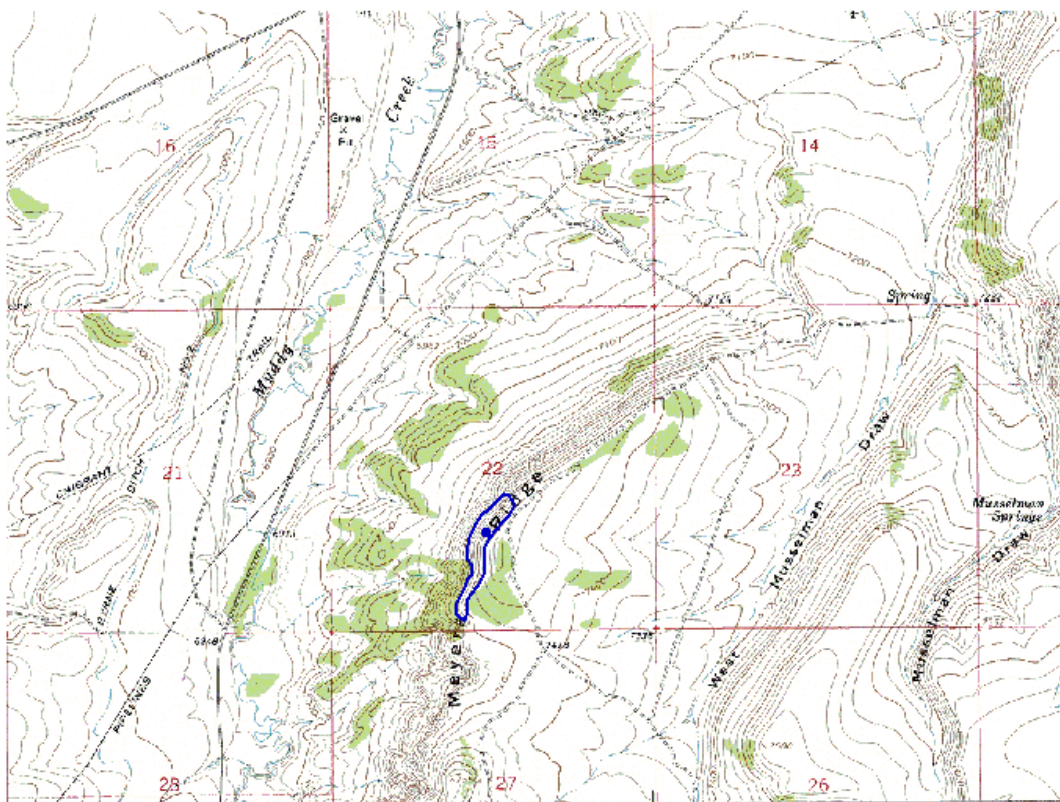
Specimens: Rollins, R. C. (2326) 1930s?
(DS, GH).
Fertig, W. (16473). 1996. RM.

Sources:

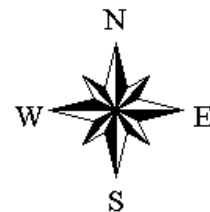
Rollins, R.C., and Shaw, E.A. 1973. The
Genus *Lesquerella* (Cruciferae) in North
America. Harvard Univ. Press, Cambridge,
MA.

Author: Walter Fertig
Edition Date: 00-06-16

Lesquerella prostrata Occurrence # 004
Leroy Quad
T15N R117W S22
(W8 of SE4 & E8 of SE4 of SW4)



- Lesquerella prostrata Transect # 1
- ▭ Lesquerella prostrata



WYOMING NATURAL DIVERSITY
DATABASE

-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD
Number: 005

Status

Data Sensitive?: No
Identification verified: Yes
TNC Global Rank: G3
WYNDD State Rank: S1
Federal Status: None
WY Distribution Note: Regional endemic

Location

County: Uinta
USGS Quad Names: Piedmont Reservoir,
Ragan, Sulphur Creek Reservoir
Latitude: 411503N (centrum)
South Latitude: 411430N
North Latitude: 411636N
Longitude: 1104325W (centrum)
East Longitude: 1104234W
West Longitude: 1104507W
Map Accuracy: Precise; location is within a
75 foot radius of point on USGS topo map.
Town/Range/Section: T15N R118W S22
(S2 OF NW4 & N4 OF NE4 OF NW4); 28
(SW4 OF NE4 & SE4SE4 OF SW4); 32
(NW4NW4NW4)
Location: Overthrust Belt, ridge ca 1 mile
east of The Boilers and east of Albert
Spring, ca 1.5 miles south of Interstate 80,
ca 12.5 air miles east of Evanston and 2.5
miles southeast of junction of Interstate 80
and US Highway 189.

Population Data

Last Observed: 1999-06-28
First Observed: 1995-06-24
Occurrence Rank: B
Rank Comments: Population locally
abundant in small area; habitat somewhat

disturbed by underground cable corridor,
but otherwise threats are low.

Data: Population consists of 4 sub-
populations on BLM lands and 2 on
adjacent private lands in an area of ca 3 x
1.5 miles. Total population estimated at
1600-2400 plants based on 1996 and 1999
surveys.

1999-07-02: Sec 22 NW4 colony: Population
estimated at over 1000 plants by Jill
Walford. 380 plants counted in 30 x 1 meter
monitoring transect, with ca 50%
reproductive (in flower or fruit), 25%
vegetative, and 25% seedlings. Density 12.6
plants/square meter in monitoring transect.
Overall density appears lower due to small
stature of the plant. Observed with *Poa*
secunda, *Amelanchier utahensis*, and
Chrysothamnus viscidiflorus.

1999-06-29: Sec 28 SW4 colony: 100-200
plants observed by Jill Walford. 80% of
population in fruit, 10% in flower, and 10%
vegetative. Occurs with *Poa secunda*, *Phlox*
hoodii, *Sedum*, *Castilleja*, *Ipomopsis*
congesta, *Oxytropis sericea*, *Senecio*
multilobatus, and *Chaenactis douglasii*.
Sec 28 NE4 colony: 10-100 plants
estimated in population by Walford. 90% of
plants in fruit and 10% vegetative. Also
occurs with *Oryzopsis hymenoides* and
Eriogonum brevicaule. Sec 32 colony: 6
fruiting and vegetative plants observed by
Walford in brief survey. Total population
estimated at 10-50 individuals.

1996-07-05: In fruit. Locally abundant, but
largely restricted to particular soil layers.
Population estimated at 400-500 plants by
W. Fertig. Occurs with *Astragalus*
spatulatus, *A. jejunos* var. *jejunos*, *A.*
vexilliflexus, *Phlox hoodii*, *Eriogonum*
brevicaule, *Linum lewisii*, *Comandra*
umbellata, *Oxytropis sericea*, and

Ipomopsis spicata.

Size: 20 acres

1996-05-22: In flower, petals yellow.
Reported as "locally common" by W. Fertig. Also with *Cryptantha caespitosa* and *Cymopterus longipes*.

Comments: Site of monitoring transect.

Managed Area: BLM Kemmerer Field Office

1995-06-24: In flower and early fruit. 2 plants observed in brief survey by C. Refsdal-Delmatier.

Documentation

Specimens: Refsdal, C. (4361). 1995. RM.
Fertig, W. (16471, 16771). 1996. RM.
Walford, G. (3000, 3001). 1999. RM.

Habitat

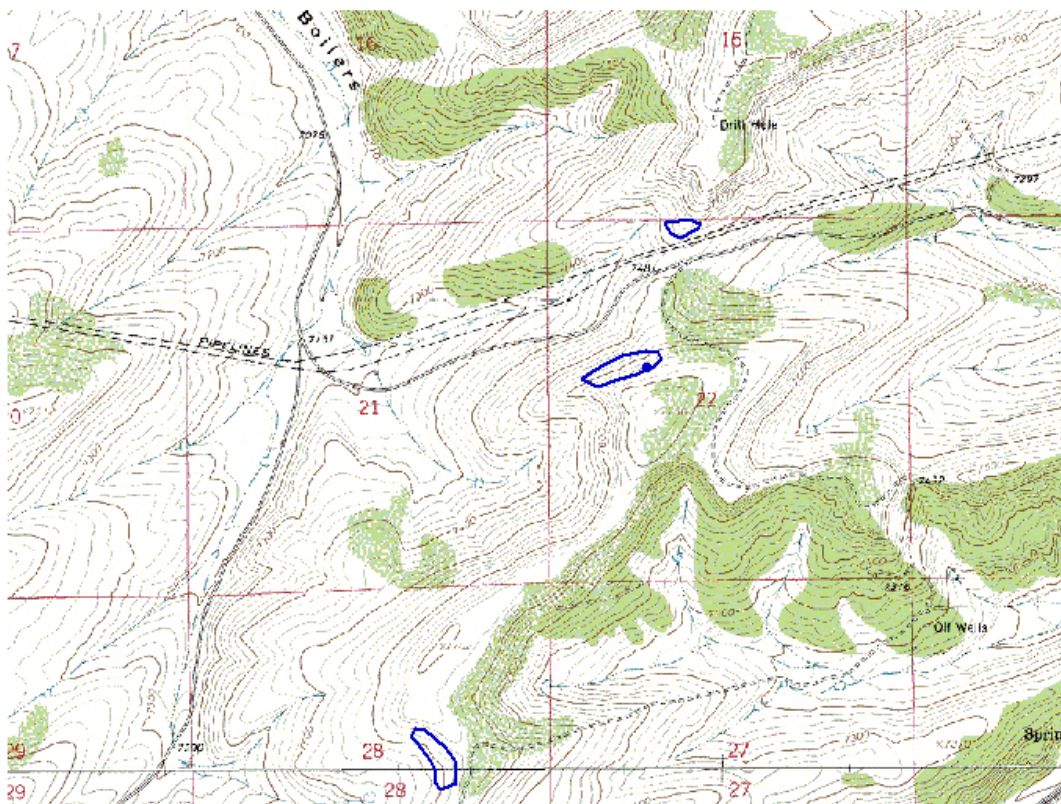
Habitat: Cushion plant-*Poa secunda* bunchgrass community on multicolored reddish and white sandstone/limestone and sandy-shale slopes and ridgetops above zone of redbed soils derived from the Wasatch Formation. Community with scattered low shrubs including *Artemisia tridentata* var. *wyomingensis*, *Chrysothamnus viscidiflorus*, stunted *Amelanchier utahensis*, and *Juniperus osteosperma*. Vegetative cover typically 10-25%. Often locally common on gray bands of poorly developed soil.
Elevation: 7300-7700 feet

Sources:

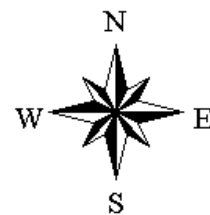
Refsdal, C.H. 1996. A general floristic inventory of southwest Wyoming and adjacent northeast Utah, 1994-1995. Unpublished report prepared for the Bureau of Land Management Wyoming State Office, Bureau of Land Management Vernal Supervisor's Office, US Fish and Wildlife Service, and US Forest Service Region 4 by the University of Wyoming, Rocky Mountain Herbarium, Laramie, WY.

Author: Walter Fertig
Edition Date: 00-06-19

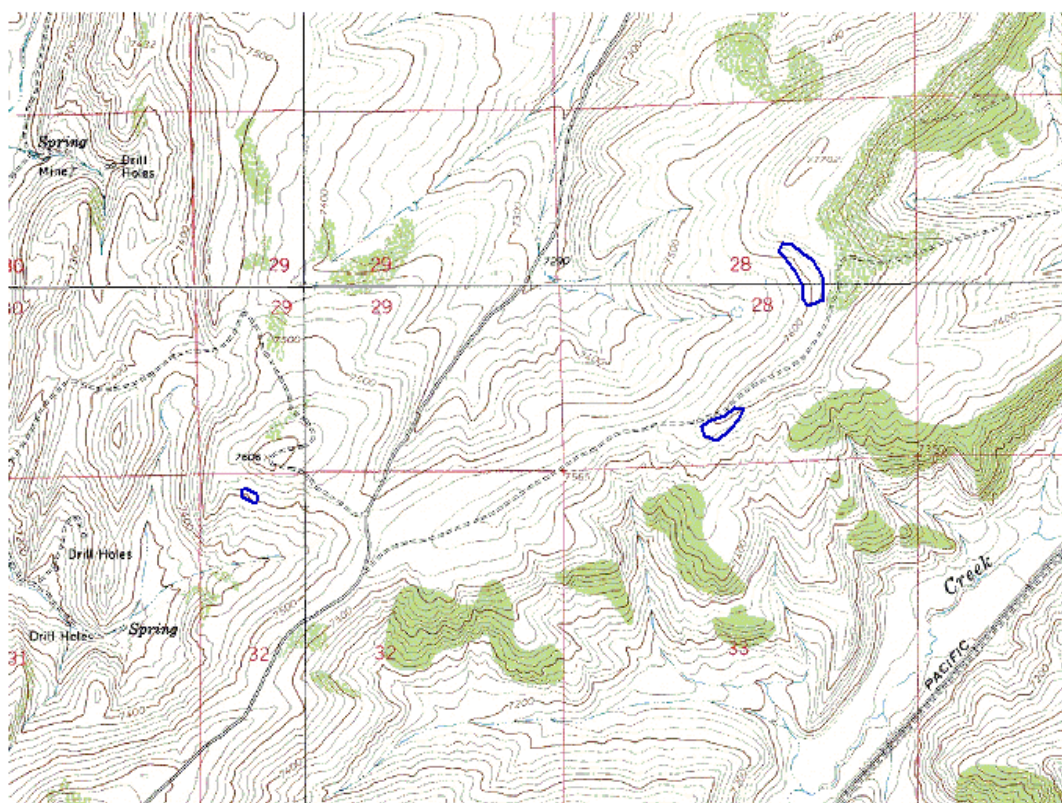
Lesquerella prostrata Occurrence # 005
Ragan & Piedmont Reservoir quads
T15N R118W S22 (S2 of NW4 &
N4 of NE4 of NW4) & S28 (SW4 of NE4)



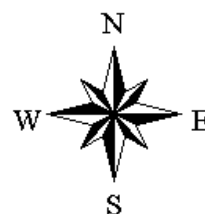
- Lesquerella prostrata Transect # 3
- ▭ Lesquerella prostrata



Lesquerella prostrata Occurrence # 005
Ragan, Piedmont Reservoir,
& Sulphur Creek quads
T15N R118W S28 (SW4 of NE4
& SE4SE4 of SW4) & S32 (NW4NW4NW4)



 **Lesquerella prostrata**



WYOMING NATURAL DIVERSITY
DATABASE

-Element Occurrence Record-

LESQUERELLA PROSTRATA
PROSTRATE BLADDERPOD
Number: 006

Status

Data Sensitive?: No
Identification verified: Yes
TNC Global Rank: G3
WYNDD State Rank: S1
Federal Status: None
WY Distribution Note: Regional endemic

Location

County: Uinta
USGS Quad Name: Sulphur Creek Reservoir
Latitude: 410933N
Longitude: 1104550W
Map Accuracy: Precise; location is within a
75 foot radius of point on USGS topo map.
Town/Range/Section: T14N R118W S30 (N4
of SW4 of SE4)
Location: Overthrust Belt, slopes on south
side of Aspen Mountain, just north of
Aspen Creek and the Aspen Tunnel/Hilliard
Road, ca 1.4 miles east of Oyster Shell
Ridge, 2.3 miles northeast of Hilliard, and 4
air miles east of WY Highway 150.

Population Data

Last Observed: 1999-07-01
First Observed: 1999-07-01
Occurrence Rank: B?
Rank Comments: Population small, habitat
near roadside and used for livestock
grazing.
Data: 1999-07-01: Population estimated at
10-100 plants in quick survey by Jill
Walford. Plants mostly in fruit. Occurs with
Chrysothamnus viscidiflorus and
Orobanche fasciculata.

Habitat

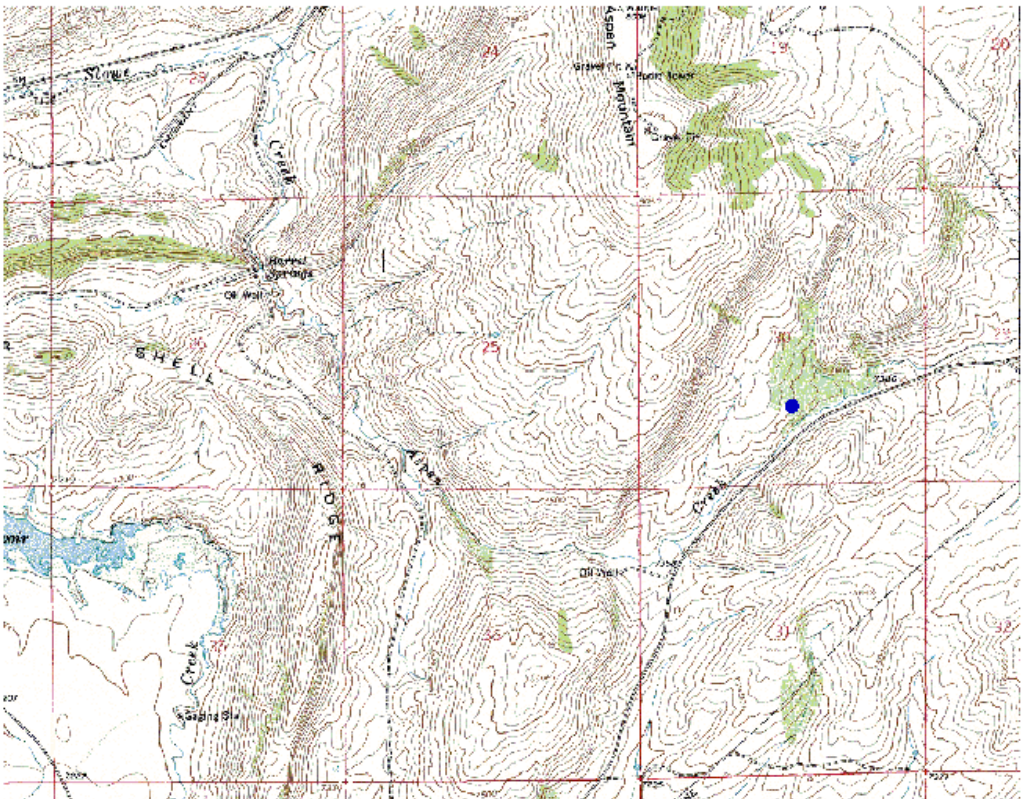
Habitat: *Artemisia tridentata* var.
wyomingensis/*Chrysothamnus viscidiflorus*
community with 50% vegetative cover on
dry southwest-facing 10 degree slope on
gravelly-silty grayish brown soil derived
from limestone shale (Aspen Shale
Formation).
Elevation: 7380 feet
Size: 1 acre

Managed Area: BLM Kemmerer Field Office

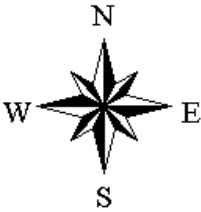
Documentation

Specimens: Walford, G. (3008). 1999. RM.
Author: Walter Fertig
Edition Date: 00-06-16

Lesquerella prostrata Occurrence # 006
Sulphur Creek Reservoir Quad
T14N R118W S30 (N4 of SW4 of SE4)



● **Lesquerella prostrata**



Appendix B.

Survey Routes

Surveys for *Lesquerella prostrata* were conducted by Walter Fertig (May and July 1996 and June 1997) and Gillian Walford (June-July 1999). Potential areas for survey were determined from BLM land management maps and USGS topographic maps based on the presence of steep-sided ridges of the Green River, Wasatch, or Bridger Formation on accessible public lands. Surveyed locations are depicted on the accompanying maps and are summarized below. Areas of additional potential (but unsurveyed) habitat are listed in the table on page 35.

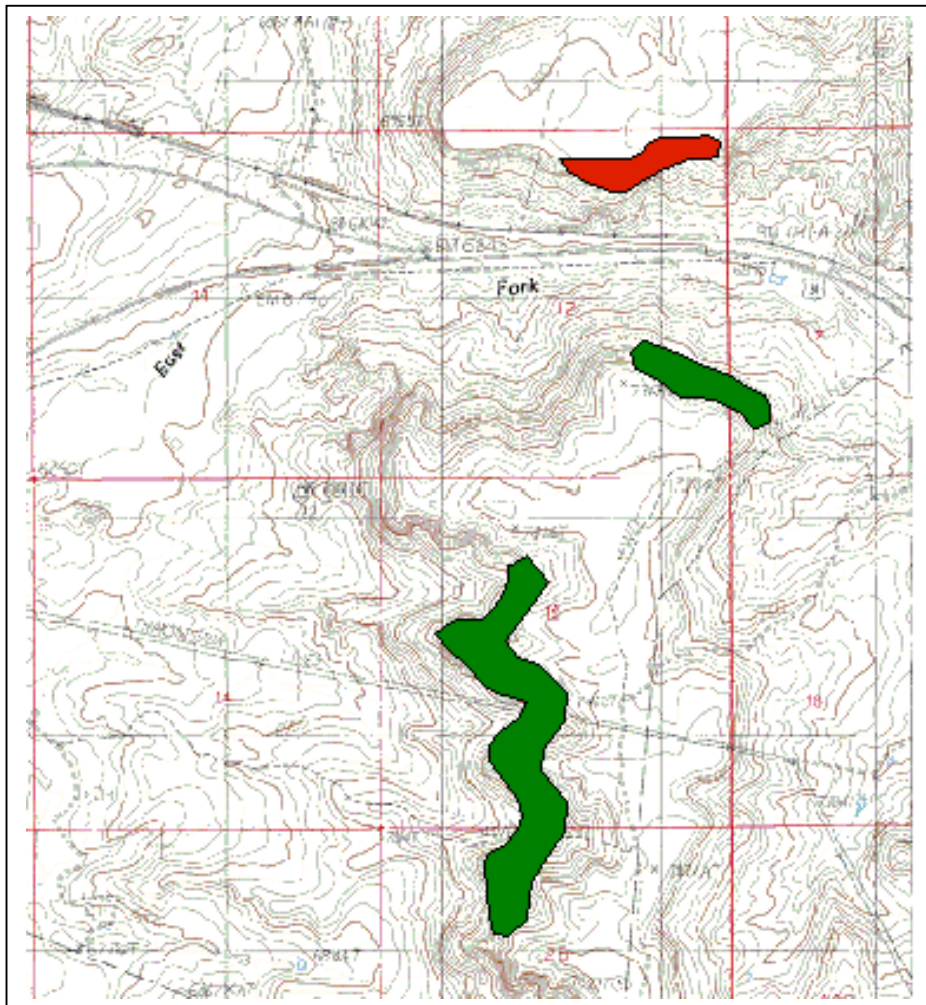
Surveyed Sites 1996-1999
(see the following maps for exact locations, depicted in red)

DATE	SURVEYOR	COORDINATES	<i>L. prostrata</i> FOUND?
2 July 1999	Walford	T15N R118W S22	Yes
5 July 1996	Fertig		
22 May 1996	Fertig		
29 June 1999	Walford	T15N R118W S28	Yes
29 June 1999	Walford	T15N R118W S32	Yes
18 June 1997	Fertig	T14N R118W S6	No
1 July 1999	Walford	T14N R118W S30	Yes
1 July 1999	Walford	T14N R119W S28	No
3 July 1999	Walford	T14N R117W S26	No
3 July 1999	Walford	T14N R117W S24	No
3 July 1999	Walford	T14N R117W S12	No
30 June 1999	Walford	T14N R117W S6	Yes
30 June 1999	Walford	T15N R117W S22	Yes
22 May 1996	Fertig		
18 June 1997	Fertig	T15N R117W S18	No
10 June 1997	Fertig	T15N R117W S4	No
18 June 1997	Fertig	T15N R119W S14	No
18 June 1997	Fertig	T15N R118W S18	No
1 July 1999	Walford	T21N R117W S12	Yes
9 June 1997	Fertig	T21N R117W S5-6	No

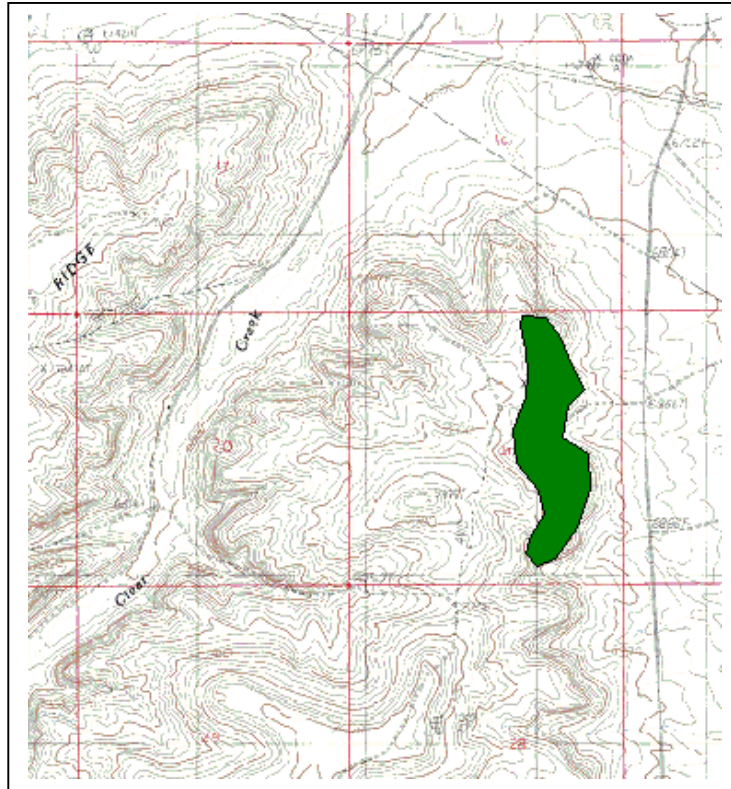
Potential Unsurveyed Habitat for *Lesquerella prostrata* in Wyoming
 (see the following maps for exact locations, depicted in green)

T14N R119W S26	T15N R116W S16
T14N R119W S22	T15N R116W S10-11
T14N R119W S14	T16N R116W S21, 28
T14N R117W S18 E2	T16N R117W S10
T13N R117W S4 NW4	T17N R117W S34
T13N R118W S10	T21N R117W S12 E2
T14N R117W S2	T21N R117W S13, 24
T15N R117W S34	T22N R118W S25-26
T15N R117W S32	T22N R117W S31
T15N R117W S26	T21N R117W S21
T15N R118W S2	T22N R117W S28

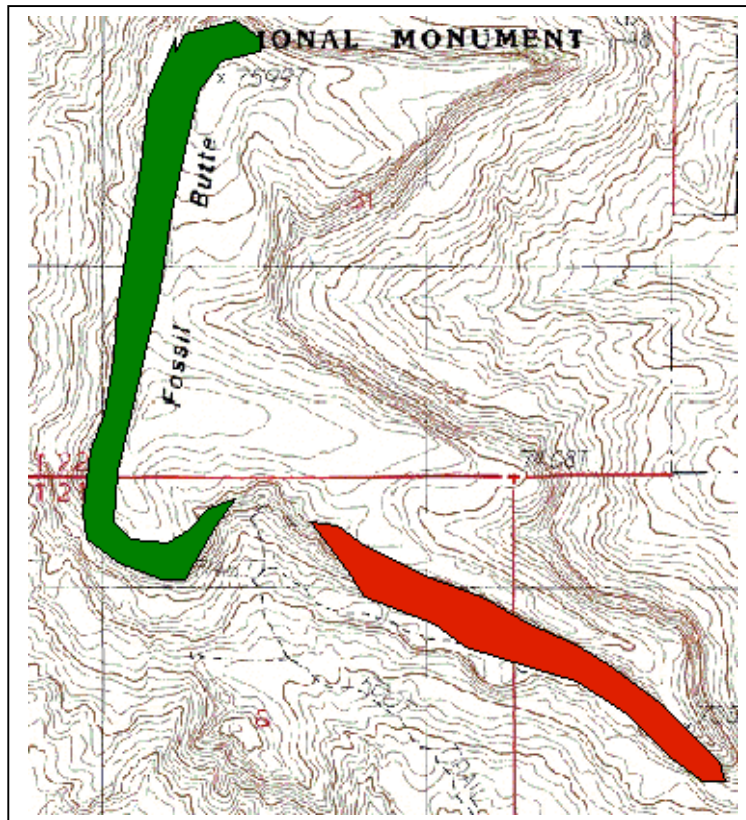
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fossil Quad, T21N R117W



1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fossil Quad, T21N R117W



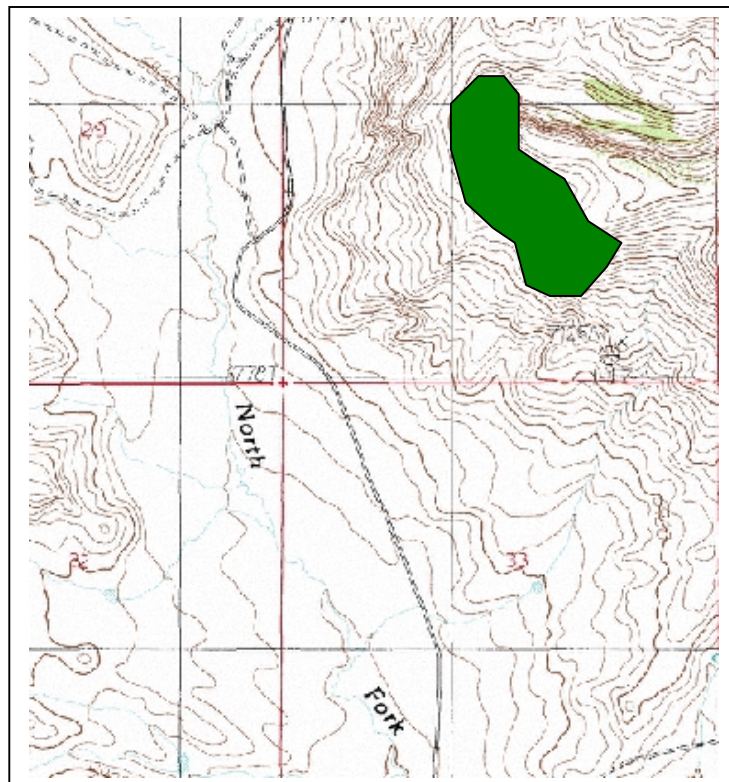
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fossil Quad, T21-22N R117-118W



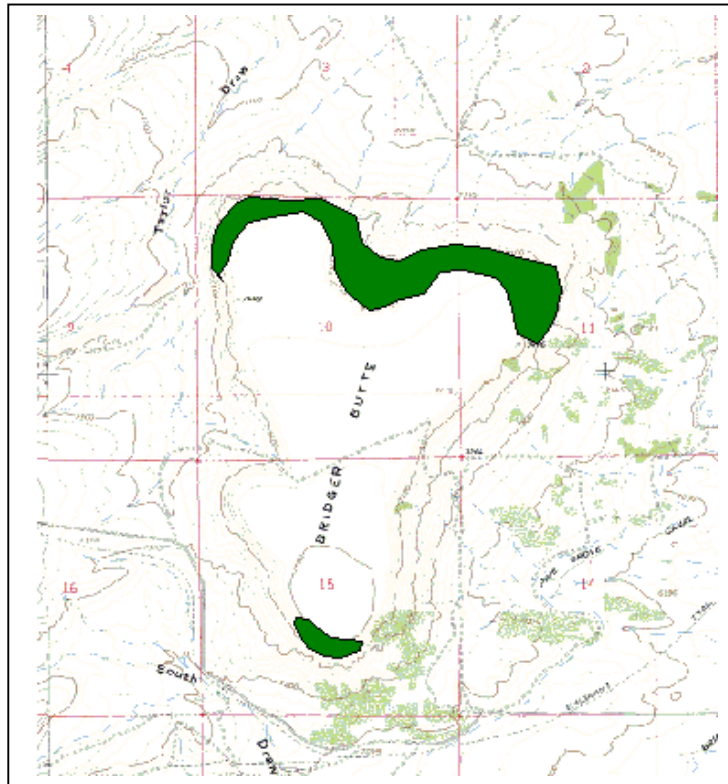
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Nugget Quad, T22N R118W



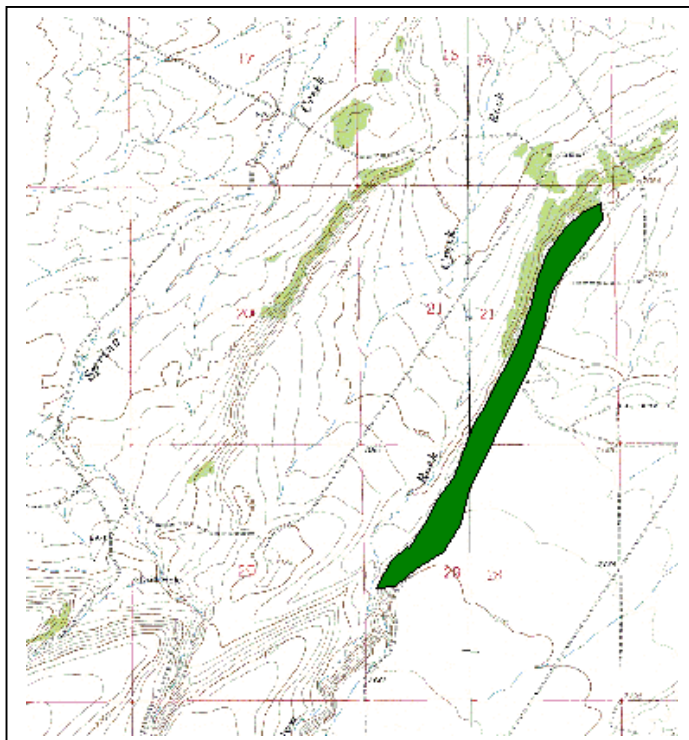
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fossil Quad, T21N R117W



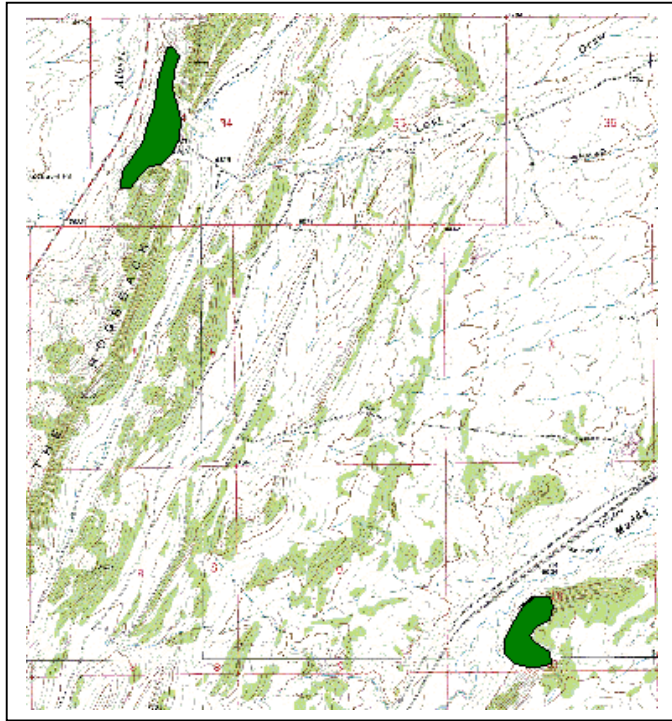
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fort Bridger Quad, T15N R116W



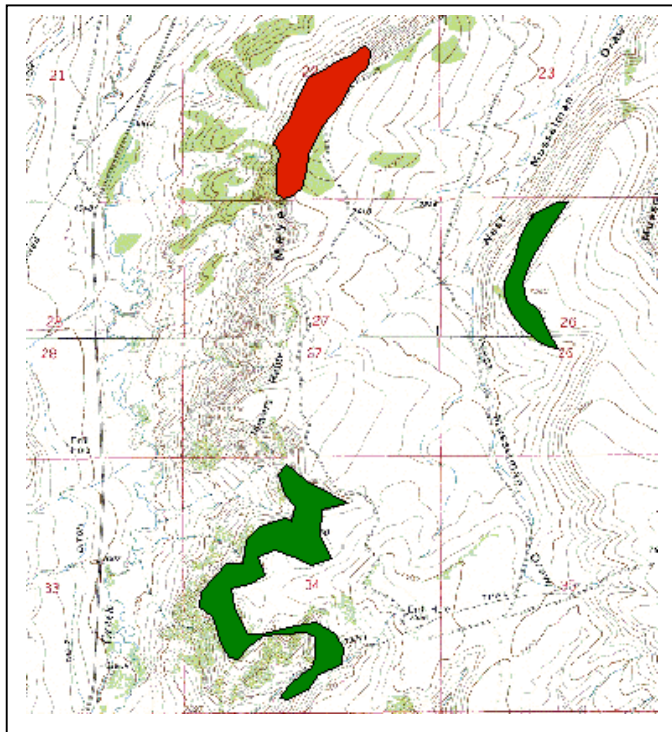
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Fort Bridger & Leroy quads, T16N R116W



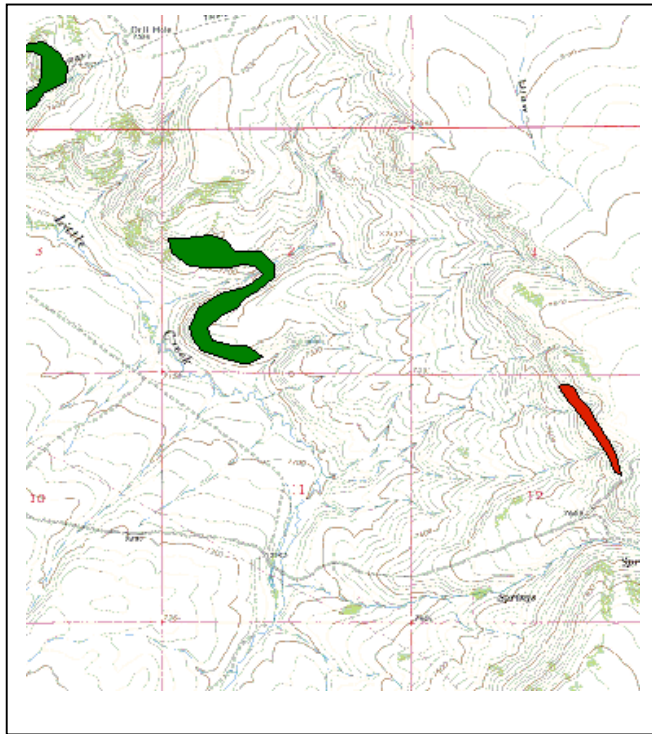
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Leroy, Ragan, Bridger, & Meadow Draw quads, T16-17N R117W



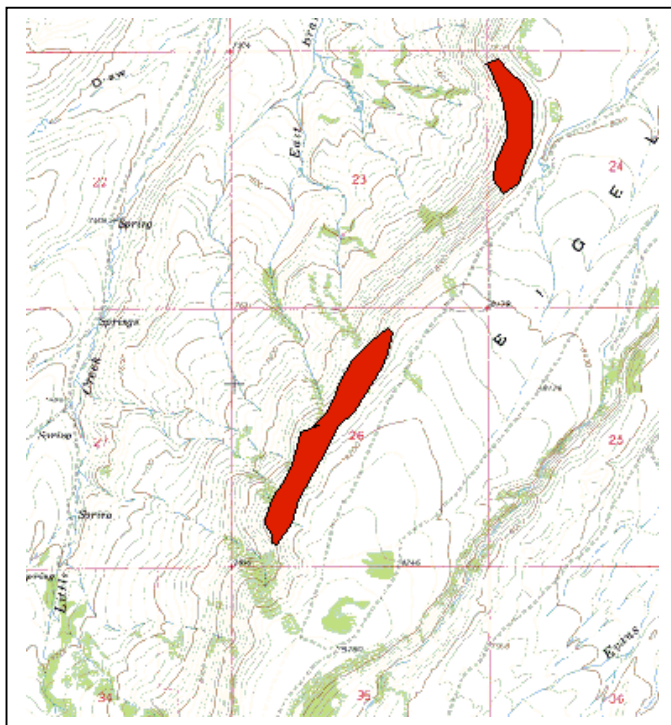
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Leroy & Hague Creek quads, T15N R117W



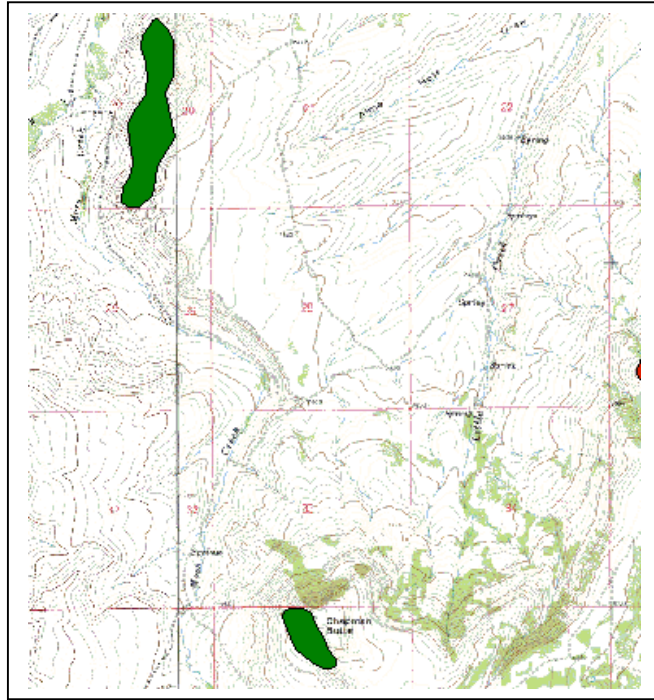
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Hague Creek Quad, T14N R117W



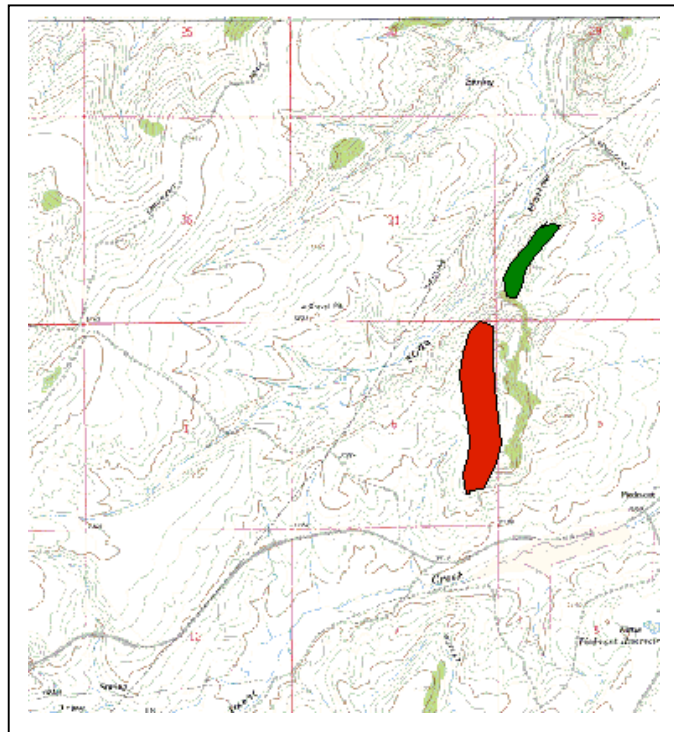
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Hague Creek Quad, T14N R117W



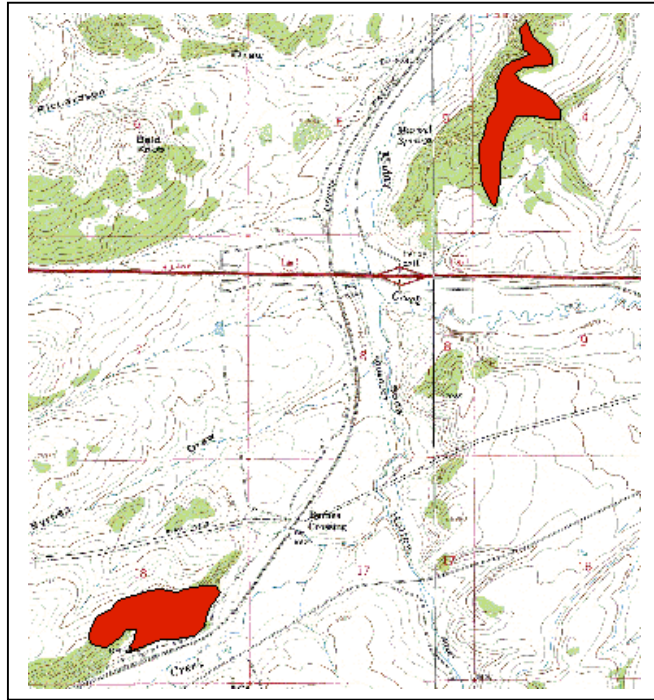
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Hague Creek & Piedmont Reservoir quads, T13-14N R117W



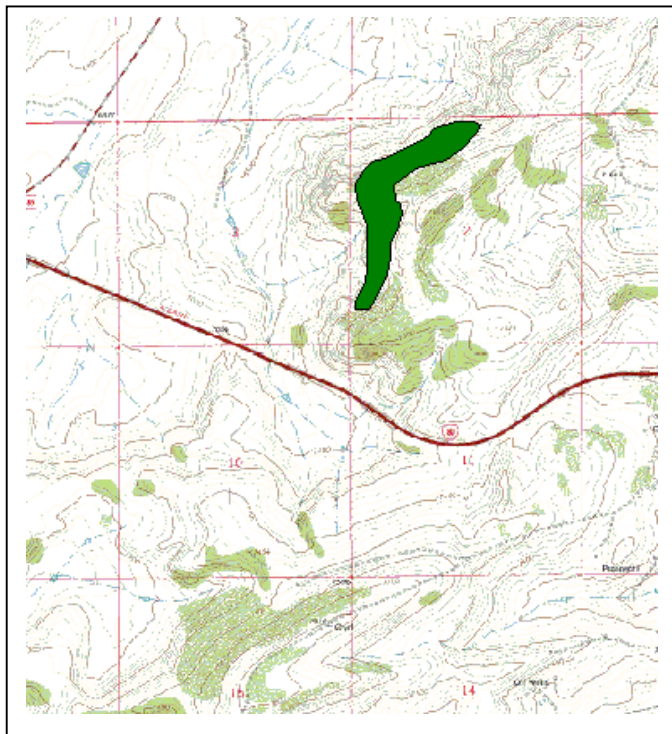
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Piedmont Reservoir Quad, T14-15N R117-118W



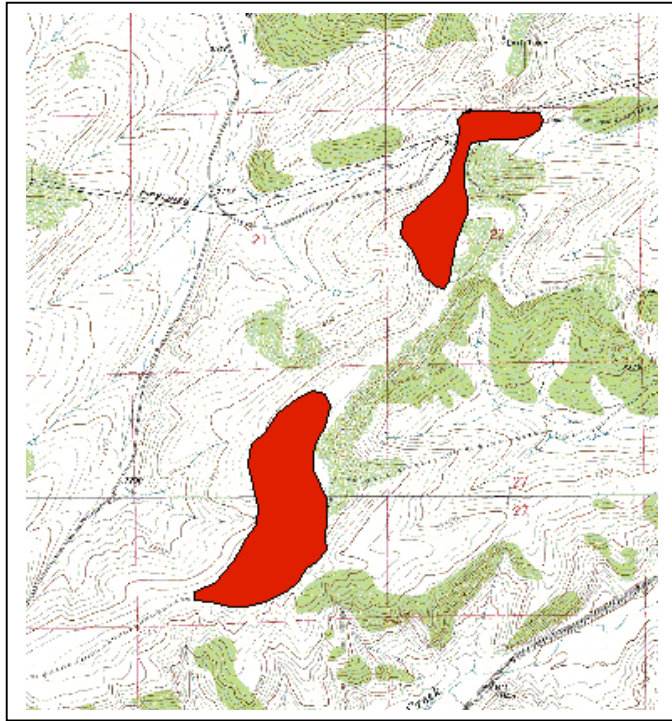
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Leroy & Ragan quads, T15N R117W



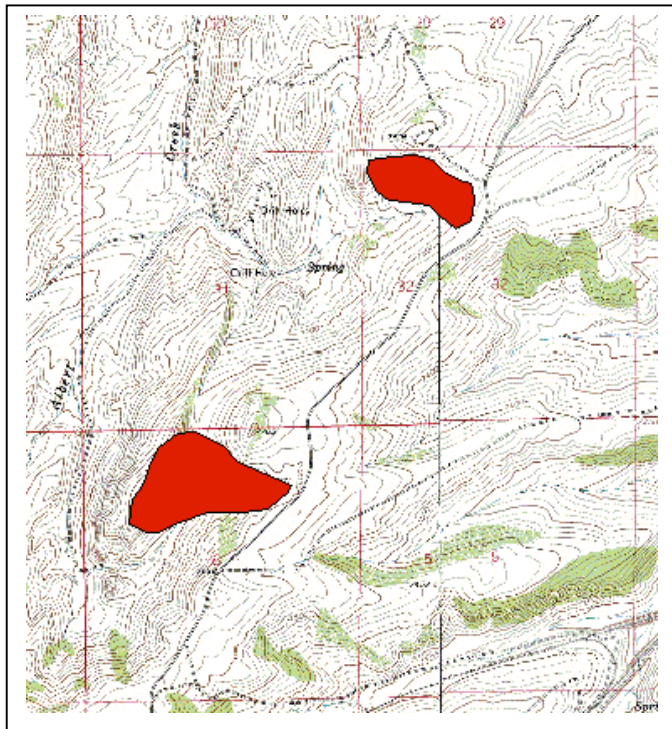
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Ragan Quad, T15N R118W



1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Ragan & Piedmont quads, T15N R118W



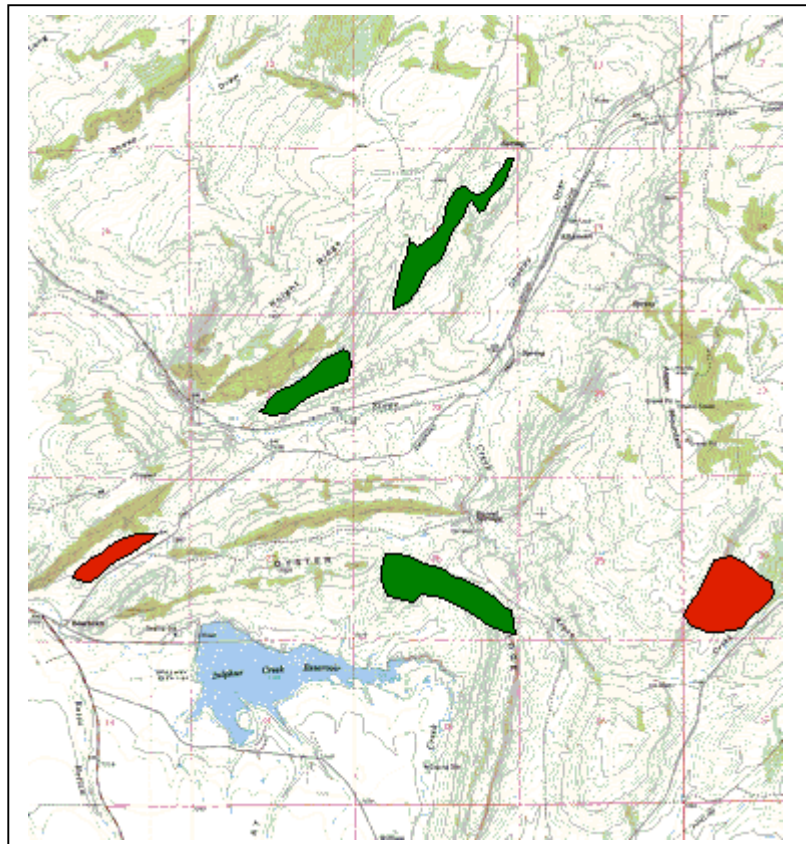
1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Piedmont Reservoir & Sulphur Creek Reservoir quads, T14-15N R118-119W



1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Guild Hollow Quad, T15N R118-119W



1996-99 survey routes (red) and potential habitat (green): USGS 1:24,000 Sulphur Creek Reservoir Quad, T14N R118-119W



Appendix C.

1999 Demographic Monitoring Data for *Lesquerella prostrata*

Transect Locations:

Transect # 1

County: Uinta.

Occurrence: # 004 (see Map in Appendix A, page 27).

Legal Description: T15N R117W S22 SE4 of NE4 of SW4.

Transect Bearing (from 0 towards 30 m): 19° N.

USGS Quad: Leroy.

Directions: West slope of Meyers Ridge approximately 100 meters below the summit rim just above white sandstone slab outcrop. Compass bearing from the 0 meter origin to the intersection with the main two-track road is 278°. GPS reading: Lat 41° 15.742' N; Long 110°35.662 W.

Habitat: Open *Juniperus osteosperma* community with scattered *Artemisia tridentata*, *Chrysothamnus viscidiflorus*, *Poa secunda*, *Oryzopsis hymenoides*, and cushion plants on 5 degree slope of white limestone/sandstone covered clays.

Comments: Most of the reproductive individuals were in fruit or late flower. About 50% of the reproductive plants were average-size with multiple, elongate racemes, while the other half were very small and would otherwise have been scored as “vegetative” plants except for the presence of flowers or fruits. Smaller plants produced shorter racemes and fewer fruits.

Transect # 2

County: Uinta.

Occurrence: # 002 (see map in Appendix A, page 23)

Legal Description: T14N R117W S6 (SE4 of NE4 of SE4)

Transect Bearing (from 0 towards 30 m): 220° SW.

USGS Quad: Piedmont Reservoir.

Directions: Ridge on divide between Soda Hollow and Piedmont Creek, ca 1 mile west of Piedmont. Accessible by two-track road just north of main Piedmont Road. Transect located 20 m southeast of the two-track near the section line and below the last two short summits of the ridge.

Habitat: Cushion plant/*Poa secunda* community with scattered *Artemisia tridentata* var. *wyomingensis* and *Chrysothamnus viscidiflorus* on dry limestone clay with surface gravel.

Comments: *L. prostrata* difficult to observe; plants often growing within cushion mats of other species.

Transect # 3

County: Uinta.

Occurrence: # 005 (see map in Appendix A, page 30)

Legal Description: T15N R118W S22 NW4 of SE4 of NW4

Transect Bearing (from 0 towards 30 m): 240° SW.

USGS Quad: Ragan

Directions: South side of The Boilers road and pipeline route near summit of small knoll (point 7756), ca 2.5 air miles south of Interstate 80. Transect begins near east edge of white limestone slope.

Habitat: Sparsely vegetated low *Artemisia tridentata*/cushion plant/*Poa secunda* community on rocky, gravelly, silty limestone and redbed north-facing slope.

Comments: Densest population sampled in 1999. Plot 29 looks identical to plot 30, but has no plants.

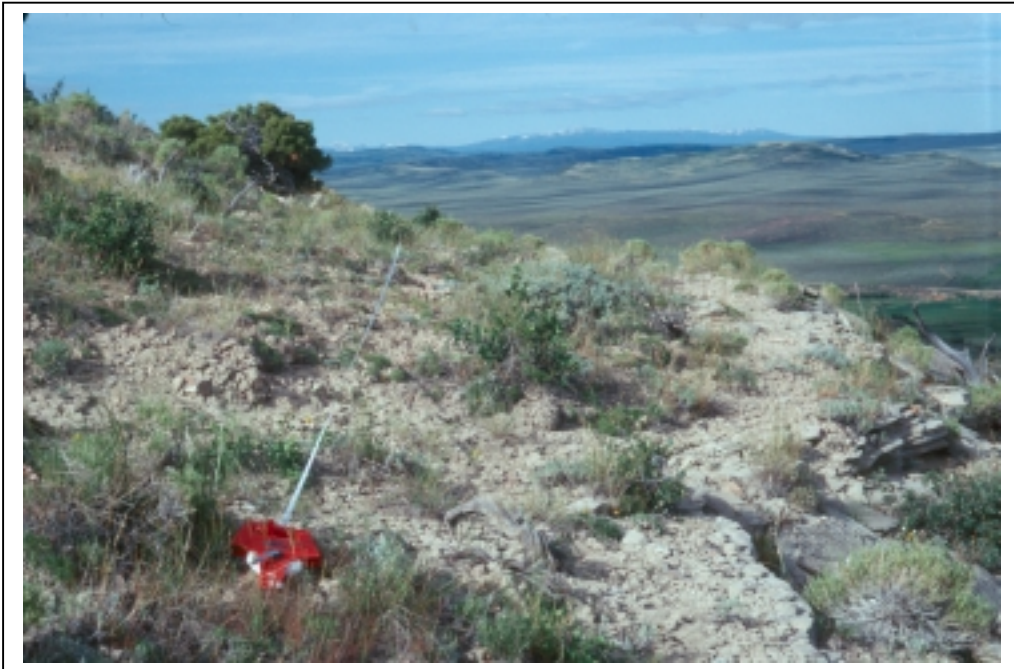
Sampling Method:

Three permanent 30 x 1 meter belt transects were established following the protocol of Lesica (1987). Plots were selected subjectively at known *L. prostrata* colonies to reflect “typical” density and habitat conditions. Starting points were marked by re-bar and low rock piles. For each transect, 30 1 x 1 meter plots were framed by meter sticks and read from the left side of the baseline tape. In each plot, data were collected on the number of individual plants in each of four age/size classes: Seedlings (non-flowering rosettes with 2-4 leaves), Vegetative (non-flowering rosettes usually with 5 or more basal leaves), Reproductive (flowering or fruiting plants with at least 1 inflorescence), and Dead (dead plants of any size class).

Summary of Results:

All three transects have a mix of size and age classes, indicating that reproduction has been taking place in recent years. High number of seedling plants may reflect moist conditions of Spring 1999.

Below: *Lesquerella prostrata* Monitoring transect # 001, Meyers Ridge, Uinta County, WY, T15N R117W S22 SW4.



The large number of small reproductive plants is also indicative of good moisture. Total density ranges from 1.4-12.7 plants per square meter, with higher densities observed in sites with greater shrub cover and better developed soils. Seedling density varies from 0.1-3.2 plants per square meter, while vegetative rosettes range from 0.3-3.3 per square meter. Reproductive plants range from 1.43-12.7 plants per square meter. Because this is the first year of sampling, no estimates of population trend can be made.

Recommendations:

Plots of 1 square meter are a good size to quickly monitor density of *Lesquerella prostrata* in sparse populations, but may be too large for more densely populated colonies. These plots should be re-measured on an annual or biennial basis until a trend is established, after which monitoring could become less frequent. Establishment of additional transects would be desirable.

Lesquerella prostrata
Transect # 1 Census Data

Date: 30 June 1999

Surveyor: Gillian Walford

Plot #	Total #	# Seedlings	# Vegetative	# Reproductive	# Dead
1	0	0	0	0	0
2	4	0	0	4	0
3	0	0	0	0	0
4	4	2	0	2	0
5	15	5	0	9	1
6	5	1	1	3	0
7	1	0	0	1	0
8	2	0	0	2	0
9	10	3	1	6	0
10	6	0	1	5	0
11	6	1	1	4	0
12	10	3	0	7	0
13	4	3	0	1	0
14	0	0	0	0	0
15	1	0	0	1	0
16	2	0	0	2	0
17	1	0	0	1	0
18	1	0	0	1	0
19	2	0	0	2	0
20	2	0	0	2	0
21	17	1	1	15	0
22	6	2	0	4	0
23	6	3	0	3	0
24	8	2	2	3	1
25	4	1	0	3	0
26	7	1	1	5	0
27	11	3	0	8	0
28	1	0	0	1	0
29	3	1	1	1	0
30	3	0	0	3	0
TOTAL	142	32	9	99	2

Seedlings per square meter: 1.07

Vegetative rosettes per square meter: 0.30

Reproductive plants per square meter: 3.3

Total # of plants per square meter: 4.73

Lesquerella prostrata
Transect # 2 Census Data

Date: 1 July 1999

Surveyor: Gillian Walford

Plot #	Total #	# Seedlings	# Vegetative	# Reproductive	# Dead
1	1	0	0	1	0
2	0	0	0	0	0
3	2	0	0	2	0
4	1	0	0	1	0
5	1	0	0	1	0
6	1	0	0	1	0
7	0	0	0	0	0
8	0	0	0	0	0
9	1	0	0	1	0
10	2	1	0	1	0
11	1	0	0	1	0
12	1	0	0	1	0
13	6	1	0	5	0
14	1	0	0	1	0
15	3	0	0	3	0
16	1	0	0	1	0
17	1	0	0	1	0
18	0	0	0	0	0
19	0	0	0	0	0
20	1	0	0	1	0
21	3	1	1	1	0
22	1	0	0	1	0
23	3	0	1	2	0
24	0	0	0	0	0
25	3	0	0	3	0
26	0	0	0	0	0
27	2	0	0	2	0
28	2	0	0	2	0
29	2	0	0	1	1
30	3	0	0	3	0
TOTAL	43	3	2	37	1

Seedlings per square meter: 0.1

Vegetative rosettes per square meter: 0.07

Reproductive plants per square meter: 1.23

Total # of plants per square meter: 1.43

Lesquerella prostrata
Transect # 3 Census Data

Date: 2 July 1999.

Surveyor: Gillian Walford

Plot #	Total #	# Seedlings	# Vegetative	# Reproductive	# Dead
1	47	21	10	16	0
2	37	10	9	18	0
3	28	7	4	16	1
4	59	19	17	23	0
5	5	0	2	3	0
6	3	0	1	2	0
7	2	2	0	0	0
8	1	0	1	0	0
9	2	0	0	2	0
10	4	1	2	1	0
11	8	1	4	3	0
12	2	0	0	2	0
13	11	0	6	5	0
14	11	1	1	9	0
15	8	0	3	5	0
16	20	8	3	9	0
17	11	2	4	5	0
18	19	7	8	4	0
19	3	1	0	2	0
20	11	0	5	6	0
21	12	3	4	5	0
22	8	1	2	5	0
23	18	4	6	8	0
24	5	2	0	3	0
25	3	1	0	2	0
26	13	2	6	5	0
27	7	0	1	6	0
28	1	0	0	1	0
29	0	0	0	0	0
30	21	3	0	18	0
TOTAL	380	96	99	194	1

Seedlings per square meter: 3.2
 # Vegetative rosettes per square meter: 3.3
 # Reproductive plants per square meter: 6.47
 Total # of plants per square meter: 12.7