Appendix C. Powder River County - Plant Species of Concern
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Jeanne R. Janish .................................................................. Figure 20, 28 (From 'Vascular Plants of the Pacific Northwest')
Debbie McNiel .................................................................. Figure 1, 24, and 26
John Challey .................................................................. Figure 21
Joe Duft .............................................................................. Figure 18
Bonnie Heidel .................................................................. Figure 3-7, 9, 15, 16, 19, 22, 23, 25, 27, 29 and 30
Hollis Marriott .................................................................. Figure 11 and 12
Steve Shelly ...................................................................... Figure 8
Dee Strickler ...................................................................... Figure 2
The New York Botanical Garden ........................................... Figure 10, 13, 14, and 17

**Astragalus barrii** Barneby
Barr’s milkvetch
Bean Family (*Fabaceae*)

**BLM status:** Watch  
**USFS status:** Sensitive  
**Global rank:** G3, **State rank:** S3

**State status summary:** Barr’s milkvetch is a regional endemic with more than 20 occurrences in Montana. It has no immediate threats but is potentially vulnerable to exotic species invasion through disturbances of fire and coalbed methane developments.

**Description:** Barr’s milkvetch is a perennial that grows in low, dense mats. Leaves have 3 narrowly lance-shaped leaflets 1 to 4 cm long and densely covered with short white hairs (Figures 1 and 2). Stipules at the leaf bases are membranous. Purple or pinkish-purple pea shaped flowers are borne in a narrow, open, and few-flowered inflorescence (Figure 3). The petals are 7 to 17 mm long. The calyx is 3 to 5 mm long and densely covered with long, white hairs. The sparsely white, hairy pod is narrowly elliptical, 4-8 mm long, and 1 to 2 mm in diameter. Flowering occurs in May-early June and fruiting from late May-June.

The only other mat-forming species with 3-leaflets in the range of *Astragalus barrii* in Montana are *Astragalus gilviflorus* and *Astragalus hyalinus*. Both have white flowers and a longer calyx tube (6 to 16 mm) than the *Astragalus barrii* calyx tube length (2.8 to 5 mm). They also have peduncles that are short (<3.5 mm) or absent compared to *Astragalus barrii* peduncle length (7 to 24 mm).

**Distribution:** Barr’s milkvetch is a regional endemic found at the junctions of northwestern South Dakota, northeastern Wyoming, and southeastern Montana. In Montana it has been collected from four counties, but one of these represents a single historic record that has not been relocated. Besides the historic Carter County record, there are a total of 35 other records for the species. Half of these (18) are in two areas of concentration and may represent two large population complexes.

Both of the large concentrations of *Astragalus barrii* are in Powder River County, which has a total of 23 known records for the species. As mentioned above, 18 of these in the County are highly concentrated and may represent two large population complexes along part of Otter Creek and the Little Powder River. In visits to the latter, we determined that the species repeats consistently in the landscape where suitable habitat is extensive so that some of these records are very large. We also began documenting intervening records that connect the concentrations of 18 records.

*Astragalus barrii* has the highest number of records among the Montana species of concern in the study area, and is the only one that has a geographically In a few cases, the gentler terrain of the Midway-
limited distribution beyond state borders. We represent its distribution in the county by a separate symbol in the map showing locations of plant species of special concern in Powder River County (see the map labeled Figure 11 in the body of the report).

Note: In the course of this study, we determined that *Astragalus hyalinus* is much more widely distributed than previously known in the western and southern parts of the County. It cannot be distinguished vegetatively from *Astragalus barrii*, but has a white or cream-colored flower that readily distinguishes it during flowering (Figure 4). All new records of *Astragalus barrii* were verified using flowering material. They also differ in their habitat, with *Astragalus hyalinus* restricted to settings with sandstone outcrop. We note that *Astragalus barrii* superficially looks like the common *Astragalus spathulatus*, but the latter has an elongated flowering stalk (Figure 5). A complete set of technical distinguishing characteristics between *Astragalus barrii* and *Astragalus hyalinus* is summarized in Heidel and Marriott (1996).

**Habitats:** Barr's Milkvetch is restricted to sparsely vegetated knolls, buttes, and barren hilltops, on calcareous soft shale and siltstone. It is often found at the rim of outcrops and midslope benches (Figure 6). These microhabitat settings represent thin silty ecological sites. Their clay fraction is high enough in places to classify the microhabitats as thin clayey. There is little or no soil profile development but there are generally no restrictive layers that would classify the microhabitats as a shallow ecological site. These microhabitats occur within predominantly silty ecological sites, but while they occupy a small fraction of the landscape, they are widespread and recurrent in part of BLM-administered lands (Figures 7 and 8).

This species is restricted to upper-and mid-slope topographic positions and does not occupy outwash or eroded gullies below the outcrops. It is most commonly found on slopes with northern and eastern aspects and does not occur on steep south-facing slopes with their salt-affected vegetation. In other words, its habitat represents a small subset of outcrop settings and a small subset of the thin silty ecological site.

In Powder River County, Barr's Milkvetch is found, almost without exception, on the Midway-Elso rocky soils on 35% to 70% slope (Parker et al. 1971).
Else rocky soils (8% to 35%) is the mapping unit. Soil textures range from silty clay to loam, and are frequently uniform silt loam. The soil surface is often uniform silt but may have a veneer or be embedded with pebbles and cobbles.

The Little Powder River habitat is on the open plains while the Otter Creek habitat is in a pineland setting, but they otherwise have similar species composition. The sparse vegetation has many of the same species present from place to place even if the relative cover of any one of them is variable. The most common shrub is usually Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). The most common grass that we noted on BLM lands is western wheatgrass (*Pascopyrum smithii*) or else thickspike wheatgrass (*Elymus lanceolatus*) on level terrain, but neither is mentioned among the associated species on Custer National Forest (Schassberger 1988, 1990). Other directly-associated species typically include leafy musineon

*Figure 6. Habitat of Astragalus barrii*

*Figure 7. Landscape of Astragalus barrii habitat*

(Musineon *divaricatum*), broom snakeweed (*Gutierrezia sarothrae*), few-flowered buckwheat (*Eriogonum pauciflorum*), textile onion (*Allium textile*), cushion goldenweed (*Haplopappus acaulis*), x goldenweed (*Haplopappus armeriodes*), and (*Hymenoxys richardsonii*). There are species that have been characterized as part of associated vegetation in past reports and as part of the information recorded for individual records, however, they are actually found on adjoining sandstone substrates rather than soft shale with *Astragalus barrii*. Plants such as little bluestem (*Andropogon scoparius*) and soapweed (*Yucca glauca*) do not generally occupy the same microhabitats as *Astragalus barrii* while they may be common and conspicuous all around it.

**Comments:** The species almost always occurs in habitats considered secondary range, in addition, the plant is not grazed due to its low growth form. It is little-affected by allotment management practices and developments unless concentrated livestock trampling occurs in its habitat. *Astragalus barrii* is potentially vulnerable to exotic species encroachment. It is an early-succession species and its forested habitat settings may be subject to increased tree canopy cover. Any revegetation efforts should avoid seeding sweetclover (*Melilotus spp.*) in proximity. There is little encroachment by weedy annuals at present. The fine texture and instability of the soils limit invasion by annual bromes. A non-native mustard, malcolmia (*Malcolmia africana*), is in early stages of invading fine-textured slopes of Powder River County and elsewhere. It appears to be spreading along backroads.

*Figure 8. Habitat of Astragalus barrii above Horse Creek*
Carex grvida Tuckerm. var. grvida
Pregnant sedge
Rush Family (Cyperaceae)

BLM status: Watch
USFS status: Sensitive
Global rank: G5T5?, State rank: S1
State status summary: Pregnant sedge is known from fewer than six occurrences. Its habitat is in primary range that is potentially affected by grazing and logging.

Descriptions: Pregnant sedge is a perennial grass-like plant that forms clumps of stems that reach up to 6 dm high and arise from short root stocks. Leaves are 4 to 8 mm wide and clustered near the base of the plant. Flowers are clustered in egg-shaped spikes that are about 1 cm long; the female flowers (perigynia) occupy most of the spike, but there are a few male flowers at the tip (Figures 9 and 10). Spikes are aggregated at the top of the stem and subtended by 2 to 3 leaf-like bracts that are shorter than the inflorescence. Scales subtending each perigynia are oval with a long point at the tip. The perigynia are 4 to 5 mm long and egg-shaped; they gradually taper into a beak that is serrate on the edges and notched at the tip. There are few or no nerves visible on the outer face of the perigynia. There are 2 stigmas, and the seed is 2-sided. Fruit matures in late June-July.

Carex is a large and difficult genus; there are many species similar to Carex grvida. The awn-tipped scales of the perigynia, relatively broad leaf blades (greater than 3.5 mm) and loose sheath help distinguish it from the closely-related Carex hoodii with which it overlaps in distribution. A hand lens or microscope and technical key are essential for positive determination.

Distribution: Pregnant sedge is an eastern species that is peripheral in Montana, extending from Saskatchewan to Pennsylvania, south to New Mexico, Texas, Missouri and Virginia. In Montana, it is known from only three southeastern counties, including Big Horn, Powder River and Rosebud counties. It has only been found in two places on the Ashland District of the Custer National Forest (Heidel and Marriott 1996), and these represent the known Powder River and Rosebud records. In the course of this survey there was very little suitable habitat in the areas that were visited, so it was not found and no additional data was collected on this species and its distribution.

Habitat: This species is restricted to open woods on the plains, often in ravines with deciduous trees in a setting that is with or without flowing water. The ravines border overflow ecological sites. In the Ashland District, the species occurs along ravine bottoms dominated by a combination of green ash and chokecherry (Fraxinus pennsylvanica / Prunus virginiana) within pine woodland (Figure 11). In some cases, aspen (Populus tremuloides) is present. Other associated species include serviceberry (Amelanchier alnifolia), Hood’s sedge (Carex hoodii), Torrey’s sedge (Carex torreyi) and Sprengel’s sedge (Carex sprengelii), and other plants of eastern deciduous woodland.

Comments: This species seems restricted to mesic microhabitats within pine woodland, making it particularly vulnerable to changes in pine woodland structure and composition as affected by
grazing and logging. These settings are vulnerable to invasion of exotic species like Kentucky bluegrass (*Poa pratensis*).

There were fire scars among the Ponderosa pine (*Pinus ponderosa*) at one of the Ashland District sites where the species was found suggesting the plant can survive ground fire.

**Figure 11.** Habitat of *Carex graida var. graida* (Custer Natl. Forest).

**Ceanothus herbaceus** Raf.

New Jersey tea
Buckthorn Family (*Rhamnaceae*)

BLM status: Watch
USFS status: -
Global rank: G5T?, State rank: SH
State status summary: New Jersey tea is known from one historic occurrence in Montana. It may be declining elsewhere on the Great Plains. Relocation efforts have not been successful to date.

**Description:** New Jersey tea is a highly branched shrub with stems up to 1 m high. The alternate, lance-shaped to narrowly elliptic leaves are 2 to 6 cm long and have serrated edges; they are glabrous on top but hairy beneath. Numerous white flowers are born in congested, rounded inflorescences that terminate the growing branches (Figures 12 and 13.) Each flower is about 2 to 3 mm high with 5 calyx lobes and 5 petals that have a linear basal portion and a hood-shaped blade. There are 5 stamens and a 3-lobed ovary. The fruit is a glossy, brown, 3-lobed, globose capsule that is 3 to 5 mm wide. It flowers in June.

The *Ceanothus* genus has simple alternate leaves with 3 prominent, somewhat parallel veins arising from nearly the same point near the base of the blade. It also has hood-shaped petals, and 3-lobed fruits. *Ceanothus herbaceus* can be distinguished from other members of the genus by its narrower leaves, which are less than 2 cm wide and not shiny on the upper surface.

**Figure 12.** Illustration of *Ceanothus herbaceus*

**Distribution:** New Jersey tea is an eastern species that is peripheral in Montana. It grows from Quebec to Manitoba to eastern Montana, and south to Georgia, Texas, and Colorado. In Montana, the plant is known from a historic record in Powder River County.

There are few pine stands represented on BLM lands in the study area. Of the few that were visited in the course of this survey, none appeared to have suitable microhabitat. It is not known whether this species is restricted to pineland habitat in Montana, and this species was also sought in the closest grassland habitat on BLM lands. No additional data were collected on this species and its distribution.

**Figure 13.** Photograph of *Ceanothus herbaceus*
Habitat: The single collection label for this species in Montana described the setting as a "grassy, pine-covered hill." It may represent a sandy, stony, or gravel ecological site. In the Great Plains, this species occupies rocky prairie hillsides, roadsides and open pine forests.

Comments: Management considerations are unknown. This species has diminished elsewhere on the Great Plains (Ode, pers. comm.) Some species of Ceanothus are highly palatable to wildlife and livestock.

Chenopodium subglabrum (S. Wats.) A. Nels.
Smooth goosefoot
Goosefoot Family (Chenopodiaceae)

BLM status: Watch
USFS status: -
Global rank: G3G4, State rank: S1
State status summary: Smooth goosefoot is known from fewer than six occurrences in Montana, one of which may be extirpated. It occupies early-succession habitat that is potentially affected by grazing, changes to river flow regimes, and noxious weeds.

Descriptions: Smooth goosefoot is an annual with erect, simple, or high stems (2 to 3) 8 cm (Figure 14). The alternate leaves are linear with entire margins, single veined, glabrous, up to 3 cm long. The small, green flowers are grouped in remote clusters in simple or branched spikes (Figure 15). Each flower lacks petals but has 5 glabrous sepals and 5 stamens. The one seeded fruit is compressed hemispherically and is relatively large; 1 to 2 mm across, exposing a jet-black fruit at maturity that readily separates from the pericarp (fruit wall). Fruiting occurs in late June-July.

Chenopodium subglabrum sometimes occurs with and is related to Chenopodium leptophyllum. They both have linear, single-veined leaves but the latter are farinose white (mealy usually whitish colored). Chenopodium leptophyllum also has densely-clustered flowers, a relatively unbranched growth form, fruits usually 1 mm or smaller, and seeds which do not detach from the pericarp.

Distribution: This species is known from the Great Plains, extending from Manitoba to Alberta, and south to Kansas and Nevada. It is also in the Midwest, including Michigan and Missouri. Plants of the Pacific Northwest, including Washington, Idaho and Oregon, are said to differ from Great Plains material (Crawford 1973) and their proper disposition has not been resolved. It is centered in the Nebraska Sandhills and widely scattered in five eastern Montana counties.

The species was documented in Powder River County and on BLM-administered lands for the first time during this study, where it was found in the northeastern corner of the County.

Habitat: Chenopodium subglabrum occupies two main kinds of settings, namely sparsely vegetated sand dunes and sandy terraces of major rivers on the plains. Only one of the five Montana records, located in Custer County, was from a riparian setting on the Tongue River. All five records represent sandy ecological sites. This species is a
poor competitor and is associated with other annuals and early-succession species.

The Powder River County setting is an isolated ridgetop blowout rather than a sand dune (Figure 16). This is a different setting than has been found to date, and may mean that the species is not so narrow in its habitat requirements as previously interpreted. It was restricted to one segment of the blowout rim where sand was being deposited, in association with lemon scurfpea (*Psoralea lanceolata*), sandhills bluestem (*Andropogon hallii*) and western spiderwort (*Tradescantia occidentalis*). While there were no other nearby ridgetops with blowout features, the Midway-Rockland association and the sandy ecological site that it represents are widespread (Parker et al. 1971). They are associated with many other landforms capped by sandstone.

The were no records of *Chenopodium subglaibrum* documented in the few riparian settings we surveyed where we had access along the Powder River.

**Comments:** Maintenance of early seral habitat in the upland settings requires a balance of fire and/or grazing. Maintenance of early seral habitat in the riparian setting requires intact flow regimes and landscape processes over a larger scale. Tamarisk control is needed in riparian habitat, and leafy spurge is at early stages of invading some of the most extensive upland habitat.

The Powder River population occurs in secondary range, where livestock use is light and water sources are remote.

**Cyperus schweinitzii** Torr.
Schweinitz' flatsedge
Rush Family (*Cyperaceae*)

**BLM status:** Watch
**USFS status:** -
**Global rank:** G5, **State rank:** S2

**State status summary:** Schweinitz' flatsedge is known from 6 to 20 occurrences, most of which have low numbers. It is an early-succession species, affected by absence or excess of disturbance and potentially threatened by noxious weeds.

**Description:**
Schweinitz' flatsedge is a grass-like perennial with stems that are 10 to 40 cm high, arising from short, irregularly swollen rhizomes (Figure 17). The leaves are 1 to 4 mm wide and located mostly near the base of the plant. The inflorescence is subtended by 3 to 6 long, leaf-like bracts, some of which are wider than the leaves (Figure 18). The inflorescence is made up of ascending clusters of flattened spikelets that are 5 to 25 mm long and borne on stalks that are very short to long. The flowers are crowded opposite each other and consist only of a small, pointed scale, which is about 3 to 4 mm long and subtends 3 stamens and an ovary. The seed is triangular in cross-section. Fruit mature in late June-July.

This is our only perennial *Cyperus* and is the only one occurring in upland habitat.

**Figure 16.** Habitat of *Chenopodium subglaibrum* (Medicine Rocks SP)

**Figure 17.** Illustration of *Cyperus schweinitzii*
**Distribution:** This species occurs from Alberta to Quebec and south to New Mexico and West Virginia. It is concentrated around the Great Lakes and the Great Plains. It is known from five counties in eastern Montana.

This species was documented for the first time in Powder River County at two sites in the northeastern corner.

**Habitat:** In the Great Plains, it is restricted to sparsely vegetated loose sand, most often associated with sand dunes. A typical sand dune blowout is shown in Figure 19. It occupies sandy ecological sites.

The Powder River County settings represent small blowouts at toeslope positions where there is loose sand eroded from sandstone outcrops above. This is a different setting than has been found to date, and may mean that the species is not so narrow in its habitat requirements as previously interpreted. It was more common in the setting where there was more wind erosions. Associated species included prairie sandreed (*Calamovilfa longifolia*), threadleaved sedge (*Carex filifolia*), and western spiderwort (*Tradescantia occidentalis*). While this species often overlaps with *Chenopodium subglabrum* (discussed previously), and is found in a wider range of successional conditions, it was not found in the same habitats in this study.

While there were no other nearby blowout features along Cedar and Stump creeks, the Elso–Ocean Lake association and the sandy ecological range site that this landscape represents are widespread (Parker et al. 1971).

**Comments:** Maintenance of the species' early-succession habitat requires balances involving grazing and/or fire. The species may decline in the absence or excess of these. Leafy spurge is in early stages of invading some of its most extensive habitat in the state.

The Powder River populations occur in primary range, and they are sufficiently far from Cedar and Stump creeks that the range is in good-excellent condition. There are no associated management concerns.

**Figure 18. Photograph of *Cyperus schweinitzii* (close-up)**

**Figure 19. Habitat of *Cyperus schweinitzii* (Sheridan Co.)**

**Dichanthelium oligosanthes (J. A. Schultes) Gould var. scribnerianum (Nash) Gould**

Scribner’s panic grass
Grass Family (*Poaceae*)

**BLM status:** Watch. This species is not known from BLM-administered lands in Montana and is recommended for dropping accordingly.

**USFS status:**
**Global rank:** G5T5, State rank: S1
**State status summary:** Scribner's panic grass is known from fewer than six occurrences. Most have low population numbers and one represents a historic record. It is potentially affected by grazing and logging.

**Description:** Scribner's panic grass is a perennial that forms clumps of simple or branched stems 1 to 6 dm tall (Figure 20). The lower leaves are 3 to 10 cm long and 3 to 12 mm wide, while the upper...
leaves are short and relatively broad. Leaves are mostly glabrous, but the sheaths surrounding the stem are glabrous to long-hairy. There is a short fringe of hairs on the leaf where it meets the stem, which is known as a ligule. The flowers are borne on short-to long-stalks, which are arranged in a conical inflorescence that is 3 to 8 cm high (Figure 21).

Inflorescences of the main stems are larger than those of the branches. Each egg-shaped spikelet has one flower, is about 3 mm long, and consists of two glumes enclosing a lemma and a palea that may or may not be hairy. Fruit matures in late June - early July.

The relatively large, egg-shaped, single-flowered spikelets help identify this as Dichanthelium. This species branches mainly in the upper portions of the stem, while Dichanthelium wilcoxianum usually branches near the base. A hand lens or microscope and technical key are needed for positive determination.

Distribution: This species is widespread in the eastern United States, extending from southern Canada to Mexico. It is peripheral in Montana, where it is known from both the Flathead Valley and from four records in Powder River County. The latter are all on the Ashland District of Custer National Forest.

Habitat: In Montana, this species is only known from open ponderosa pine woodlands of valleys and plains (Figure 22). These woodlands fall within the Pinus ponderosa / Mahonia repens habitat type, comprised of silty ecological sites with fine sandy loams and loams. The associated species include bluebunch wheatgrass (Pseudoroegneria spicata), Sprengel’s sedge (Carex sprengelii), Dewey’s sedge (Carex deweyana), and field milkvetch (Astragalus agrestis). Dichanthelium oligosanthes has two growth forms in different times of the growing season, requiring partial or direct sunlight throughout the season.

In Powder River County, it has only been found in four places on the Ashland District of Custer National Forest. There are few pine stands represented on BLM lands in the study area. Of the few that were visited in the course of this survey, none appeared to have suitable microhabitat. No additional data were collected on this species and its distribution.

Other: This species occupies open pine woodland that may be affected by vegetation encroachment and by grazing, particularly early in the growing season.
season. It does not compete with sod-forming grasses like Kentucky bluegrass (Poa pratensis).

One of the Ashland District sites where the species was recorded had burned (occurrence no. 003). Only one plant was found, indicating a capacity for survival without providing basis for interpreting species' response to fire. We note that Dichanthelium vilcoxianum, which has a similar growth form, was locally common following the 1988 wildfires in the Sioux District (Heidel and Dueholm 1995).

**Mentzelia nuda** (Pursh) Torrey & Gray
Bractless mentzelia
Loasa Family (Loasaceae)

**BLM status:** Watch  
**USFS status:** -  
**Global rank:** G5, **State rank:** S1  
**State status summary:** Bractless mentzelia is known from over five occurrences in Montana, but three of them are historic and the numbers of plants in most occurrences are low.

**Description:** Bractless mentzelia is an herbaceous biennial or short-lived perennial with one to a few erect, branched stems that arise from a taproot and are up to 1 m high. The lance-shaped, alternate leaves are 4 to 10 cm long, have deeply-toothed margins, and are petiolate below but sessile above. Foliage is covered with short, barbed hairs that cause it to stick to clothing like Velcro. Flowers that open in late afternoon are borne on short stalks arising from the axils of reduced upper leaves, or bracts. Each flower is 4 to 9 cm across and has 10, non-overlapping, white petals and numerous exserted stamens (Figure 23). The calyx forms a deep bowl with 5 narrow, pointed lobes that are 10 to 25 mm long; it also contains the ovary and bears the stamens. The cylindrical seed capsules are 2 to 3 cm long. Flowering in July.

By comparison, Mentzelia decapetala has larger flowers that are 8 to 15 cm across, and its petals overlap.

**Distribution:** This species occurs from eastern Montana to South Dakota, and south to Colorado and Texas. In Montana, it has been collected from four counties. It was documented from three occurrences in the northeastern corner of Powder River County, representing the first county records for it. Prior to these, it had not been reported in the state since 1957.

**Habitat:** The species occupies sandy or gravelly soil of open hills and roadsides on the plains. These habitats represent sandy, thin sandy, and shallow to gravel ecological sites.

In Powder River County, it was found in blowouts associated with outcrops, and on the sandstone outcrops themselves.

**Comments:** This species is potentially affected by road construction, subdivision, and exotic species invasion. The principal habitat and perturbation ecology of this species still needs clarification. All of the population numbers in the study area were very low, but there were no immediate management concerns identified.

**Phlox andicola** E. Nels.
Plains phlox
Phlox Family (Polionaceae)

**BLM status:** Watch  
**USFS status:** -  
**Global rank:** G4, **State rank:** S2  
**State status summary:** Plains phlox is known from over five occurrences. The numbers of plants at most occurrences are low, but it may be more widespread in Montana than records indicate.

**Description:** Plains phlox is a perennial herb with loosely tufted stems that are 4 to 10 cm high arising
from creeping rhizomes. The 5 to 8 pairs of opposite, linear leaves have prominent midveins and whitish bases and are 10 to 25 mm long, about 1 mm wide and come to a sharp point. Foliage is glabrous to sparsely hairy. Stems are white. One to five white flowers are borne at the stem tips (Figures 24, 25). Each flower has 5 petals and a tubular corolla. The calyx is also tubular, with 5 lobes, tangled long hairs, and 6 to 11 mm length. Flowering in May-early June.

The leaves of *Phlox hoodii* are usually less than 10 mm long, and the leaves of *Phlox alyssifolia* are 2 to 5 mm wide. Flowers are needed for determination, and hybridization between these species is reported elsewhere in the range.

**Distribution:** This species is distributed from eastern Montana and North Dakota, south to Colorado and Kansas. In Montana it is known from Carter, Powder River and Sheridan counties.

Plains phlox was only located once in the southeastern corner of Powder River County, representing the first county record for it.

**Physaria brassicoides** Rydb.
Double bladderpod
Mustard Family (*Brassicaceae*)

**BLM status:** -
**USFS status:** -
**Global rank:** G5, **State rank:** S2
**State status summary:** Double bladderpod is known from over five occurrences in Montana, these with mostly low numbers of plants.

**Description:** Double bladderpod is a perennial herb with numerous ascending stems that are 2 to 17 cm long and arising from a basal rosette that surmounts a branched crown and large taproot. The basal leaves are 2 to 8 cm long and are spoon-shaped with long petioles (Figure 26). The few, alternate stem leaves are broadly lance-shaped. Foliage is covered with silvery, star-shaped hairs appressed to the surface. The yellow, stalked flowers are borne at the tops of the stems in a narrow inflorescence that elongates as the fruit matures (Figure 27). Each flower has 4 separate (Calamovilfa longifolia), sandhills bluestem (*Andropogon hallii*), lemon scurfpea (*Psoralea lanceolata*) and yucca (*Yucca glauca*).

**Comments:** It is an early- to mid-succession species of plains and woodlands subject to vegetation encroachment in the more productive settings. Anecdotal observations indicate that it is favored by fall fire and winter grazing. Grazing and disturbances that reduce competition may benefit the species at low levels.
Figure 26. Illustration of *Physaria brassicoides*

petals that are 9 to 12 mm long and 4 separate sepals. The ascending, inflated fruits are 1 to 2 cm long, at least as wide, and flattened on top. They are 2-lobed with the locules (lobes) more deeply defined above than below. There are 2 ovules in each of the locules, attached at the top of the replum (suture between the two locules), and the replum has a linear outline. The style is 6 to 9 mm long. Flowering in May-early June, fruiting in June-July.

There are many similar-appearing *Physaria*. *Physaria didymocarpa* is reported from southeastern Montana. It differs from *Physaria brassicoides* having a replum that is obovate to elliptic; ovules usually 4 per locule, and funicles not restricted to apex. A technical manual and hand lens or microscope will be required for positive identification.

**Distribution:** This species is a regional endemic of southwestern North Dakota, southeastern Montana, eastern Wyoming and western Nebraska. In Montana, it is known from three counties to date, including Carter, Powder River and Petroleum counties. It was first documented in the state in 1994 (Heidel and Dueholm 1995, Heidel 1996).

**Habitat:** Double bladderpod is restricted to sandy or stony soil of open grassland slopes on the plains.

It grows where the vegetation is sparse, often on steep slopes where the slope is unstable and there is little or no profile development. Most settings represent sandy or thin sandy ecological sites. Associated species may include bluebunch wheatgrass (*Pseudoroegneria spicatum*), goldenweed (*Heterotheca villosa*), Indian ricegrass (*Oryzopsis hymenoides*), skunkbush (*Rhus aromatica*), wild begonia (*Rumex venosus*) and yucca (*Yucca glauca*).

**Comments:**
The species is vulnerable to exotic species competition. Avoid seeding sweetclover (*Melilotus spp.*) in the area. It is also potentially impacted by road widening, maintenance, and herbicide treatment. It occupies secondary range.

**Psoralea hypogaea** Nutt.
Little Indian breadroot
Bean Family (*Fabaceae*)

**BLM status:** Watch
**USFS status:** -
**Global rank:** G5T4, **State rank:** S2S3
**State status summary:** Little Indian breadroot is now treated as a watch species, in light of survey results documenting its breadth of distribution and indicating low vulnerability. There are fewer than twenty occurrences in widespread, localized habitats of eight eastern unglaciated counties. While it is often found in low numbers, it persists under disturbance and annual brome grass encroachment.

**Description:** Little Indian breadroot is a perennial herb that consists of a rosette of long-petioled leaves that are palmately divided into 3 to 7 linear-
elliptic leaflets that are 25 to 50 mm long with a deep, club-shaped root that is up to 6 cm long and surmounted by a subterranean connecting stem (Figure 28). Above ground, the plant foliage is covered with dot-like glands and dense, white appressed hairs, but the upper leaf surfaces become glabrous with age (Figure 29 and 30). Blue, pea-like flowers are borne in condensed spikes arising among the bases of the leaf petioles at or barely above ground-level. The tubular calyx is 6 to 9 mm long and has 4 long, narrow lobes and a fifth that is longer and broader. The upper petal is 10 to 13 mm long and held forward. The hairy pods are egg-shaped, ca. 5 mm long, and each has a beak that is 5 to 13 mm long. Flowering late May-June.

The common breadroot, *Psoralea esculenta*, has a distinct flowering stem with spreading pubescence on the stem and leaf petiole, while *Psoralea hypogaea* is stemless with appressed pubescence. Its flowers are at ground-level.

**Distribution:** This species of the western Great Plains is found from eastern Montana south to Texas and New Mexico. In Montana, it is widely distributed across unglaciated plains, documented from eight counties to date.

It was found in three of the four corners of Powder River County, and there are more records of it here than in any other county. It was otherwise reported from single isolated populations in studies that were mainly smaller in scale (Heidel 1994, Heidel 1997, Vanderhorst et al. 1998). The sandstone outcrops of Powder River County are widespread but mostly small and isolated, so we make inference from the new distribution information that the species is likely to be more widespread than previously known.

**Habitat:** Little Indian breadroot occupies sandy ecological sites; mainly in the 10" to 14" precipitation zone across grasslands and open pine woodlands on the eastern sedimentary plains. It is often found in the loose sand below sandstone outcrops, but is known from reworked alluvial sand deposits. It tends to occur in sparsely-vegetated microhabitats where more than half of the bare sand soil surface is exposed. Associated species include sand-loving species such as prairie sandreed (*Calamovilfa longifolia*), Indian ricegrass (*Oryzopsis hymenoides*), annual buckwheat (*Eriogonum annuum*), prairie lupine (*Lupinus lepidus*), and western spiderwort (*Tradescantia occidentalis*). The dominant species of the surrounding uplands may be intermingled, including blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*) and little bluestem (*Schizachyrium scoparium*). Both common Indian breadroot (*Psoralea esculenta*) and silver scurf-pea (*Psoralea argophylla*) may occasionally be present in low numbers or in the surrounding grasslands.

**Figure 29. Photograph of Psoralea hypogaea**

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Figure 30. Photograph of *Psoralea hypogaea* including root sandstone outcrops and those of the Powder River valley.

Comments: Initial observations indicate that it is not sensitive to grazing and related indirect influences. The size of populations appears to be directly related to the extent of available habitat, with a capacity to persist in low, isolated pockets.

LITERATURE CITED


Appendix C-14