Plants of

The Nature Conservancy's

Red Canyon Ranch

Prepared for the

Wyoming Nature Conservancy 258 Main St., Suite 200 Lander, WY 82520

Ву

Walter Fertig, Botanist Wyoming Natural Diversity Database 1604 Grand Ave. Laramie, WY 82070

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Introduction

The Red Canyon area of western Fremont County, Wyoming, has long been recognized as an area of high significance for rare and endemic plant species. During the early and mid-1980s, four rare plant species were discovered in the canyon and adjacent Limestone Mountain area. Two of these species, <u>Trifolium</u> <u>barnebyi</u> (Barneby's clover) and <u>Lesquerella</u> fremontii (Fremont bladderpod), were found nowhere else in the world. In order to protect these species and preserve the scenic qualities of the canyon, the Bureau of Land Management (BLM) Lander Resource Area established the Red Canyon Management Unit Area of Critical Environmental Concern (ACEC) in 1987 (encompassing BLM lands in the immediate vicinity of Red Canyon).

In 1993, private lands within Red Canyon were put up for sale. The Nature Conservancy's Wyoming Field Office expressed interest in the property and asked staff of the Wyoming Natural Diversity Database (WYNDD) to conduct additional survey work in the canyon. As a result of these studies, three additional rare species were discovered at the site, including two candidate species for federal protection. The Conservancy subsequently purchased the property and established the Red Canyon Ranch to protect the rare plant species of the ecosystem while maintaining traditional, compatible agricultural practices.

This report has been developed to summarize existing information on the rare plant species of the Red Canyon/Limestone Mountain area. In addition, it contains a preliminary checklist of the vascular flora of the ranch. This document is intended to serve as a baseline for the gathering of additional data and will be updated periodically as necessary. Lesquerella fremontii Roll. & Shaw Fremont bladderpod Brassicaceae or Cruciferae (Mustard Family)

Natural Heritage Rank: G2/S2.

- Description: Fremont bladderpod is a pubescent perennial herb with decumbent stems 2-6 inches (5-15 cm) long. The basal leaves are 5/8-1 1/2 inches (1.5-4 cm) long and elliptic to diamond shaped, while the stem leaves are shorter and narrower. The 4-petaled flowers are 1/4-3/8 inches (6-8 mm) long, yellow, and have styles about 1/16 inches (1.5-2 mm) long. Fruits are elliptic, 3/16-5/16 inches (4-7 mm) long, and inflated or slightly flattened. At maturity, the fruits are pubescent on both the outer and inner surfaces and are borne on recurved stalks.
- <u>Similar Species</u>: Alpine bladderpod (<u>L</u>. <u>alpina</u>) is the only other <u>Lesquerella</u> species currently known to occur at Red Canyon. It differs in having slender, linear leaves and fruits borne on erect or S-curved stalks, rather than on drooping, recurved stalks.
- <u>Flowering/Fruiting Period</u>: Flowering occurs from late May through late June, depending on seasonal moisture conditions. Fruits mature from early June to mid July.
- <u>Habitat</u>: Fremont bladderpod typically occurs in sparsely vegetated montane meadows or shallow depressions on slopes and ridges with scattered limber pine (<u>Pinus flexilis</u>). Soils usually are relatively deep and covered by a thin surface layer of limestone gravel. Plant cover is generally low, consisting mostly of small forbs, cushion plants, bunchgrasses, and threetip sagebrush (<u>Artemisia tripartita</u>). Occasionally, Fremont bladderpod can be found in narrow, soil-filled cracks in calcareous boulders or exposed bedrock. <u>L</u>. <u>fremontii</u> plants are usually found on west or south-facing slopes, but may also occur on exposed saddles or other aspects. Elevation ranges from 7000-9000 feet.
- <u>Global Distribution</u>: The entire global range of <u>L</u>. <u>fremontii</u> is restricted to Fremont County, Wyoming (the species is named in honor of the county). It is currently known from five extant locations, four of which are located in the southeastern Wind River Range in the vicinity of Limestone Mountain and Sinks Canyon. The remaining populations are found along Beaver Rim.

- Red Canyon Distribution: One extensive population (the largest one known) is found along Limestone Mountain and adjacent Young Mountain on deeded lands of Red Canyon Ranch and adjacent lands managed by Shoshone National Forest and the BLM Lander Resource Area. This population consists of 27 discrete, but closely aggregated subpopulations.
- Status: The Limestone/Young Mountain population was surveyed by WYNDD in 1994 and found to contain an estimated 40,000– 45,000 individuals. Based on density data gathered from permanent monitoring plots, however, the population may exceed 100,000 plants. Although often locally abundant, plants were found to be restricted to relatively small and scattered pockets of suitable habitat. L. fremontii was observed to be minimally impacted by current grazing activities, but potentially affected by mineral exploration and development or trampling by off-road vehicles. Due to its small global range, L. fremontii is currently listed as Sensitive by the US Forest Service.
- <u>Comments</u>: Over 20 species in the genus <u>Lesquerella</u> have been studied for possible cultivation as an oil-seed crop in the United States. Oils in the seeds and fruit of Fendler's bladderpod (<u>L</u>. <u>fendleri</u>), a native of arid regions of the southwestern US, have been found to be rich in hydroxy fatty acids. These acids are similar in quality to those currently available only from imported castor oil. <u>Lesquerella</u> oils can be used in the production of resins, waxes, plastics, lubricants, soaps, and cosmetics. Residual meal from the seeds also makes a protein-rich livestock feed supplement. <u>L</u>. <u>fremontii</u> may contain commercial grade oils and could provide useful genetic material for developing improved crop strains.
- References: Clark and Dorn 1979; Dorn 1992; Fertig 1995; Fertig et al. 1994; Rollins 1993; Rollins and Shaw 1973; Senft 1992.

Figure 1. <u>Lesquerella fremontii</u> (Fremont bladderpod). From Fertig et al. 1994.

Penstemon paysoniorum Keck Payson's beardtongue Scrophulariaceae (Figwort Family)

Natural Heritage Rank: G3/S3.

- Description: Payson's beardtongue is a many-branched, tufted perennial herb with stems mostly 8 inches (20 cm) or less tall. Leaves are linear to lance-shaped, glabrous, and less than 3/8 inches (1 cm) wide. The flowers are 5/8-7/8 inches (15-22 mm) long, bright blue-purple, and arranged in a dense, one-sided, glabrous inflorescence. The four pollenproducing anthers are bluish-black and short-hairy, while the fifth, sterile stamen (staminode) is hairy (bearded) at the tip.
- Similar Species: Six other species of <u>Penstemon</u> are known from Red Canyon. Each of these differs from <u>P</u>. <u>paysoniorum</u> in having either glandular-pubescent inflorescences, pubescent leaves, or glabrous anthers.

Flowering/Fruiting Period: June-July.

- Habitat: Throughout its range, Payson's beardtongue is found on barren hills, sandy creek bottoms, alkaline shale bluffs, and dry hills among sagebrush. At Red Canyon, it is found with <u>Phlox pungens</u> and <u>Physaria</u> <u>saximontana</u> in cushion plant communities at the interface of Chugwater Redbeds and Nugget Sandstone.
- <u>Global Distribution</u>: The entire global range of <u>P</u>. <u>paysoniorum</u> is restricted to the basins of southwestern and central Wyoming in Fremont, Lincoln, Natrona, Sublette, Sweetwater, and Uinta counties.
- Red Canyon Distribution: Payson's beardtongue is known only from the southern end of Red Canyon Rim above Foster Draw. Some of its habitat is found within the Wyoming Game and Fish Game Range.
- Status: This species, named in honor of Wyoming botanist Edwin Payson, has only been known to science since 1947. Surveys on public lands in SW Wyoming in the past 15 years have resulted in the discovery of nearly two dozen new occurrences. Based on this work, <u>P. paysoniorum</u> is no longer being considered as a candidate for federal protection.

- <u>Comments</u>: Red Canyon Ranch is one of just four locations in the world where this species receives formal protection.
- References: Cronquist et al. 1984; Fertig 1993; Jones 1989; Keck 1947.
- Figure 2. <u>Penstemon paysoniorum</u> (Payson's beardtongue). From Cronquist et al. 1984.

Phlox pungens Dorn Beaver Rim phlox Polemoniaceae (Phlox Family)

Natural Heritage Rank: G2/S2.

- Description: Beaver Rim phlox is a leafy perennial herb that forms loose mats of prostrate or short erect stems less than 2 inches (5 cm) tall. The stiff, prickly leaves are lanceshaped, 1/16 inches (1-1.5 mm) wide, and have glandular or ciliate margins. The margins and midribs of the leaves are prominently thickened and gradually taper to a sharp tip. The white-petaled flowers are usually over 5/8 inches (15 mm) in diameter and have a glandular-hairy calyx tube.
- Similar Species: Two other Phlox species are known from Red Canyon. Hood's phlox (P. hoodii) differs in having flowers less than 1/2 inch wide (10-12 mm), densely matted stems, and non-glandular leaves about 1/32 inches (0.5 mm) wide. Many-flowered phlox (P. multiflora) can be distinguished by its glabrous leaves and calyces, and forms larger mats.
- <u>Flowering/Fruiting Period</u>: Flowering occurs from late April to early June, depending on spring weather. Fruits are produced several weeks following flowering.
- Habitat: Beaver Rim phlox is found on sparsely-vegetated, exposed slopes of weathered limestone, claystone, conglomerate, or redbeds. At Red Canyon, it is most abundant on slopes of the Chugwater Formation, but small colonies can also be found on the Amsden and Phosphoria Formations. This species is usually found in cushion plant communities, but occasionally may be found on bare soil patches scattered among big sagebrush (Artemisia tridentata), black sagebrush (A. nova), Saskatoon serviceberry (Amelanchier alnifolia), and Utah juniper (Juniperus osteosperma).
- <u>Global Distribution</u>: The entire global range of <u>P</u>. <u>pungens</u> is restricted to the Wind River and Green River basins and SE foothills of the Wind River Range in central Wyoming (Fremont, Lincoln, and Sublette counties).
- Red Canyon Distribution: An extensive population of Beaver Rim phlox is found along the entire west-facing Chugwater slopes of Red Canyon Rim. Scattered colonies are also found in bare patches and exposed bedrock near the top of the rim, just below the caprock of Nugget Sandstone. Small colonies

are also found on the redbed knolls at the base of Oil Well Hill, and on outcrops of the Phosphoria Formation on the south end of the Hill.

Status: The Red Canyon occurrence is estimated to contain over 100,000 individuals, making it one of the most abundant populations known. <u>P. pungens</u> is currently known from 11 occurrences in the state, several of which are quite extensive. This species is currently listed as a C2 candidate for listing under the Endangered Species Act, but has recently been recommended for downlisting.

References: Dorn 1990, 1992; Fertig et al. 1994; Jones 1989.

Figure 3. <u>Phlox pungens</u> (Beaver Rim phlox). From Fertig et al. 1994.

Physaria saximontana Roll. var. saximontana Rocky Mountain twinpod Brassicaceae or Cruciferae (Mustard Family)

Natural Heritage Rank: G3T2/S2.

- Description: Rocky Mountain twinpod is a perennial herb with a basal rosette of mostly entire, spoon-shaped, pubescent, gray-green leaves. Flowering stems are usually prostrate or decumbent with small, linear leaves. Flowers have 4 yellow petals 5/16-3/8 inches (8-10 mm) long. Mature fruits are gray-hairy, inflated, and deeply notched at the top but not at the base (resembling a heart). The membranous partition (replum) separating each half of the fruit is oval and bears 2 stubby stalks (funiculi) on each face. The replum and funiculi are best observed on plants that have already lost their fruit.
- Similar Species: No other <u>Physaria</u> species are currently known from Red Canyon. Members of the genus <u>Lesquerella</u> superficially resemble <u>Physaria</u> in flower, but can be distinguished by their undivided fruits.
- <u>Flowering/Fruiting Period</u>: Flowering may occur from late April to mid-June, depending on spring conditions. Mature fruits develop in late June and early July and may persist through August.
- Habitat: Rocky Mountain twinpod occurs on sparsely vegetated rocky slopes of limestone, sandstone, or clay. At Red Canyon, it is found primarily on Chugwater redbeds, although small colonies may also be found on shales. It is commonly found with <u>Phlox pungens</u> and other cushion plants on steep slopes, ledges, and cliffs, usually with little to no shrub cover.
- <u>Global Distribution</u>: Variety <u>saximontana</u> is restricted to the Bighorn and Wind River basins and foothills of the Owl Creek and SE Wind River mountains in Fremont and Hot Springs counties, Wyoming. A second variety (var. <u>dentata</u>) is found only in Montana.
- <u>Red Canyon Distribution: P. saximontana</u> is widely distributed along the west-facing redbed slopes of Red Canyon Rim from Wyoming state highway 28 to the Little Popo Agie River. A small colony has also been observed in a draw at the base of the east side of Oil Well Hill. A complete census has not

been conducted, but these populations have been estimated to contain at least 10,000 individuals.

- Status: Rocky Mountain twinpod is currently a C2 candidate for listing under the Endangered Species Act. Recent surveys in the southern Bighorn Basin have found this species to be more abundant and under less threats than once suspected.
- <u>Comments</u>: The Red Canyon Ranch occurrence is one of only two in Wyoming that currently receive formal protection.
- <u>References</u>: Dorn 1992; Fertig 1992; Fertig et al. 1994; Jones 1989; Rollins 1984, 1993.

Figure 4. <u>Physaria</u> <u>saximontana</u> var. <u>saximontana</u> (Rocky Mountain twinpod). From Fertig et al. 1994.

Rorippa calycina Persistent-sepal yellowcress Brassicaceae or Cruciferae (Mustard Family)

Natural Heritage Rank: G3/S3.

- Description: Persistent-sepal yellowcress is a rhizomatous perennial herb with stems 4-16 inches (10-40 cm) tall. The stems and foliage are pubescent throughout with stiff, unbranched hairs. Stem leaves are pinnately divided or wavy-lobed, stalkless, and 1-2 inches (2.5-5 cm) long. The flowers are borne in terminal and axillary racemes and have 4 yellow petals 1/8-3/16 inches (3-5 mm) long and 4 sepals that persist in fruit. The fruits are egg or globe shaped, 1/8 inches (2-4 mm) long and conspicuously pubescent with unbranched hairs that are broadest at the base. Styles in fruit are 1/16 inches (1-2 mm) long and glabrous.
- <u>Similar Species</u>: No other species of <u>Rorippa</u> are currently known from Red Canyon. The most similar species in Wyoming is <u>R</u>. <u>sinuata</u>, a rhizomatous perennial with elongate, glabrous fruits over 3/16 inches (5 mm) long. All other Wyoming <u>Rorippa</u> species are taprooted annuals.
- <u>Flowering/Fruiting Period</u>: Flowering occurs from May-July. Fruits are present from June-September.
- Habitat: R. calycina occurs on sandy soils near the high water line along riverbanks and shorelines. Most occurrences in Wyoming are found along man-made reservoirs or stock ponds with fluctuating shorelines. The single known record from Red Canyon was reported from banks of temporary ponds.
- <u>Global Distribution</u>: Persistent-sepal yellowcress is known from western North Dakota, Montana, and central Wyoming and a single disjunct occurrence in the Northwest Territories of Canada. In Wyoming, it is found primarily in the Bighorn and Wind River basins and in the valley of the North Platte River.
- Red Canyon Distribution: The only known record of this species at Red Canyon is based on a 1986 herbarium collection by Dr. Richard Scott of Central Wyoming College. Information from the specimen label places the collection from the mid reaches of Red Canyon Creek, north of the Wyoming Game and Fish Winter Range. The species has not been relocated since.

- Status: <u>R</u>. calycina is listed as a C2 candidate for listing under the Endangered Species Act. Extensive surveys conducted by Robert Lichvar (former botanist with the Wyoming Natural Heritage Program) in the 1980s resulted in the discovery of over two dozen locations in Wyoming. The species is considered to be much rarer elsewhere in its range.
- <u>Comments</u>: There is relatively little potential habitat for <u>R</u>. <u>calycina</u> at Red Canyon Ranch, and its discovery there is somewhat of a surprise. If a seed bank is present along Red Canyon Creek, this species may "reappear" during years of low water.
- <u>References</u>: Fertig et al. 1994; Lichvar 1981; Rollins 1993; Stuckey 1972.

Figure 5. <u>Rorippa</u> <u>calycina</u> (Persistent-sepal yellowcress). From Fertig et al. 1994.

Townsendia spathulata Swordleaf Easter-daisy Asteraceae or Compositae (Sunflower Family)

Natural Heritage Rank: G3/S3.

- Description: Swordleaf Easter-daisy is a taprooted, often multibranched, perennial herb with a dense rosette of basal leaves. Individual leaves are woolly-hairy, narrowly spoonshaped, and 5/16-13/16 inches (7-20 mm) long. Flower heads are sessile or short-stalked and appear to be embedded among the basal leaves. Bracts of the involucre are sharp-tipped, hairy, and arranged in 2-5 rows. Ray flowers are typically brownish-orange, but can vary from pinkish-white to lavender. The pappus bristles on the fruits fall off at maturity and are of similar size and shape in both ray and disk flowers.
- <u>Similar Species</u>: Two other species of <u>Townsendia</u> are currently known from Red Canyon Ranch. Hooker's Easter-daisy (<u>Townsendia hookeri</u>) has narrow, linear leaves, pointedtipped involucre bracts arranged in 5 or more rows, and persistent pappus bristles at maturity. Parry's Easterdaisy (<u>T. parryi</u>) differs in having tall, erect stems and larger flower heads.
- <u>Flowering/Fruiting Period</u>: Flowering occurs from early May to early June. This is often one of the first species to flower in the spring.
- Habitat: Swordleaf Easter-daisy occurs on rocky, sparsely vegetated ridges and hills on sandstone, limestone, or shale-derived soils. At Red Canyon, it is most often found on Chugwater redbeds or Phosphoria substrates on bare soils in big sagebrush (<u>Artemisia tridentata</u>), threetip sagebrush (<u>A. tripartita</u>), and Utah juniper (<u>Juniperus osteosperma</u>) communities.
- <u>Global Distribution</u>: This species is found only in southern Montana and western Wyoming. In Wyoming, it is widely distributed in the Bighorn, Wind River, and Great Divide basins, and in adjacent montane foothills.
- Red Canyon Distribution: <u>T</u>. <u>spathulata</u> occurs sporadically along the summit flats of Red Canyon Rim (below the caprock ridge of Nugget Sandstone), on low knolls at the base of the eastern slope of Oil Well Hill, and on Limestone Mountain (along the western boundary of the deeded property and

Shoshone National Forest).

- Status: Observations in Spring 1995 suggest that Swordleaf Easter-daisy may be more abundant at Red Canyon Ranch than previously suspected. Recent floristic surveys elsewhere in Wyoming have found this species to be more widespread and abundant than once thought. It is no longer considered a high priority species for conservation attention.
- <u>Comments</u>: The morphologically similar species, <u>T</u>. <u>nuttallii</u> (Nuttall's Easter-daisy), was once thought to occur at Red Canyon Ranch. Specimens attributed to this species have since proven to be <u>T</u>. <u>hookeri</u>. Nuttall's Easter-daisy can be distinguished by its narrow, round-tipped leaves, involucre of pointed bracts in 5-7 rows, and irregular pappus size (the pappus of the ray flowers is significantly shorter than that of the disk flowers).
- References: Beaman 1957; Cronquist 1955; Dorn 1992; Jones 1989.
- Figure 6. <u>Townsendia</u> <u>spathulata</u> (Swordleaf Easter-daisy). From Cronquist 1955.

Trifolium barnebyi Barneby's clover Fabaceae or Leguminosae (Pea Family)

Natural Heritage Rank: G1/S1.

- <u>Description</u>: Barneby's clover is a mat-forming, sprawling, perennial herb growing up to 2 inches (5 cm) high. The leaves are divided into three oblong, toothed leaflets with 12-18 pairs of closely spaced veins. The leaflets are glabrous or occasionally pubescent along the midvein. Flowers are whitish, pea-like, and arranged in a pubescent, head-like inflorescence.
- Similar Species: Two additional native clovers are found at Red Canyon. Hollyleaf clover (<u>T</u>. gymnocarpon) has pubescent, leathery leaflets with 5-10 widely spaced veins and is not mat-forming. Andean clover (<u>T</u>. andinum) differs in having a "false involucre" of broad leaf stipules beneath the flower heads.
- <u>Flowering/Fruiting Period</u>: Flowering occurs from late April or early May to early June, depending on spring weather.
- Habitat: Barneby's clover is restricted to ledges, crevices, and seams of reddish-cream colored Nugget Sandstone. These areas are typically sparsely vegetated, but may contain scattered low trees, shrubs, and cushion plants including limber pine (Pinus flexilis), Utah juniper (Juniperus osteosperma), Ocean spray (Holodiscus dumosus), Hooker sandwort (Arenaria hookeri), and mountain milkvetch (Astragalus kentrophyta). Elevation ranges from 5900-6200 feet at Red Canyon Ranch.
- <u>Global Distribution</u>: The entire known global range of <u>T</u>. <u>barnebyi</u> is limited to the SE Wind River Range in Fremont County, Wyoming. A single, discontinuous population is found along the summit ridge of Red Canyon Rim from just south of Wyoming state highway 28 to the south end of Table Mountain.
- <u>Red Canyon Distribution</u>: At Red Canyon, Barneby's clover is found only on outcrops of the Nugget Sandstone at the top of Red Canyon Rim on deeded and BLM lands.
- Status: Hollis Marriott estimated the total population of Barneby's clover to be 11,000 plants in 1986. No census has been completed since then. This species is currently a C2

candidate for listing under the Endangered Species Act. Most of its habitat is protected within the Red Canyon Ranch and the adjacent BLM Red Canyon Management Unit ACEC.

<u>Comments</u>: Barneby's clover is considered to be a variety of the alpine species <u>T</u>. <u>haydenii</u> (Hayden's clover) by some authors. Besides significant differences in habitat, <u>T</u>. haydenii has glabrous leaves and flower heads.

<u>References</u>: Dorn and Lichvar 1981; Isely 1980; Fertig et al. 1994; Marriott 1986. Figure 7. <u>Trifolium</u> <u>barnebyi</u> (Barneby's clover). From Fertig et al. 1994.

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Appendix A. Vascular Plant Flora of Red Canyon Ranch

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The following list of vascular plant species is based on field surveys by staff of the Wyoming Natural Diversity Database, Wyoming TNC Field Office, and Red Canyon Ranch between 1993-1997, and on specimens deposited at the Rocky Mountain Herbarium and Central Wyoming College Herbarium. Species are arranged alphabetically by their scientific name within 5 life-form categories (trees, shrubs, forbs, graminoids, and ferns). Nomenclature follows Dorn (1992) for scientific names and Hitchcock and Cronquist (1973) and Welsh et al. (1993) for common names. Family acronyms are based on Weber (1982). Non-native species are indicated by "!".

Additional sampling, particularly in riparian areas and in late summer and fall, is needed to complete this checklist.

Scientific Name	Common Name	Fam.
Trees		
Betula occidentalis	Water birch	BET
Pinus contorta var. latifolia	Lodgepole pine	PIN
Pinus flexilis	Limber pine	PIN
Populus angustifolia	Narrowleaf cottonwood	SAL
Populus tremuloides	Quaking aspen	SAL
Pseudotsuga menziesii var. glauca	Douglas-fir	PIN
Shrubs		
Acer glabrum	Rocky Mountain maple	ACE
Amelanchier alnifolia	Saskatoon serviceberry	ROS
Artemisia cana	Silver sagebrush	AST
Artemisia frigida	Fringed sagebrush	AST
Artemisia nova	Black sagebrush	AST
Artemisia tridentata var. tridentata	Basin big sagebrush	AST
Artemisia tridentata var. vaseyana	Mountain big sagebrush	AST
Artemisia tridentata var. wyomingensis	Wyoming big sagebrush	AST
Artemesia tripartita var. rupicola	Threetip sagebrush	AST
Ceanothus velutinus	Deer-brush	RHM
Cercocarpus montanus	Birchleaf mountain mahogany	ROS
Chrysothamnus nauseosus var. nauseosus	Rubber rabbitbrush	AST
Chrysothamnus viscidiflorus var. lanceolatus	Green rabbitbrush	AST
Chrysothamnus viscidiflorus var. viscidiflorus	Green rabbitbrush	AST

Cornus sericea	Red-osier dogwood	COR
Crataegus douglasii var. rivularis	Douglas hawthorn	ROS
Holodiscus dumosus	Ocean spray	ROS
Juniperus communis var. depressa	Common juniper	CUP
Juniperus osteosperma	Utah juniper	CUP
Juniperus scopulorum	Rocky Mountain juniper	CUP
Leptodactylon pungens	Common prickly-phlox	PLM
Lonicera involucrata	Black twinberry	CPR
Mahonia repens	Oregon-grape	BER
Pentaphylloides floribunda	Shrubby cinquefoil	ROS
[Potentilla fruticosa]		
Prunus virginiana var. melanocarpa	Black chokecherry	ROS
Purshia tridentata	Bitterbrush	ROS
Rhus trilobata	Skunkbush	ANA
Ribes aureum	Golden currant	GRS
Ribes cereum var. pedicellare	Wax currant	GRS
Ribes inerme	Whitestem currant	GRS
Ribes oxyacanthoides var. setosum	Canada gooseberry	GRS
Ribes viscosissimum	Sticky currant	GRS
Rosa sayi	Prickly rose	ROS
Rosa woodsii	Woods' rose	ROS
Rubus idaeus	Red raspberry	ROS
Salix bebbiana	Bebb willow	SAL
Salix exigua	Coyote willow	SAL
Salix geyeriana	Geyer willow	SAL
Salix lutea	Yellow willow	SAL
[S. eriocephala var. watsonii]		
Shepherdia argentea	Silver buffaloberry	ELE
Shepherdia canadensis	Canada buffaloberry	ELE
Symphoricarpos oreophilus var. utahensis	Mountain snowberry	CPR
Tetradymia canescens	Gray horsebrush	AST
Toxicodendron rydbergii	Poison ivy	ANA
Forbs		
Achillea millefolium var. lanulosa	Western yarrow	AST
Actaea rubra	Red baneberry	RAN
Agoseris aurantiaca	Orange false-dandelion	AST
Agoseris glauca var. dasycephala	Thickhead false-dandelion	AST
Agoseris glauca var. laciniata	Cutleaf false-dandelion	AST
Allium brandegei	Brandegee onion	LIL
Allium cernuum	Nodding onion	LIL
Allium textile	Textile onion	LIL
! Alyssum alyssoides	Pale alyssum	BRA

! Alyssum desertorum	Desert alyssum	BRA
Angelica sp.	Angelica	API
Antennaria anaphaloides	Tall pussytoes	AST
Antennaria microphylla	Littleleaf pussytoes	AST
Antennaria umbrinella	Umber pussytoes	AST
Antennaria rosea	Rosy pussytoes	AST
Apocynum sp.	Dogbane	APO
Arabis drummondii	Drummond rockcress	BRA
Arabis holboellii	Holboell's rockcress	BRA
Arabis nuttallii	Nuttall's rockcress	BRA
Arabis pendulocarpa var. pendulocarpa	Drooping-fruit rockcress	BRA
Arenaria congesta var. congesta	Ballhead sandwort	CRY
Arenaria hookeri	Hooker sandwort	CRY
Arenaria nuttalli	Nuttall's sandwort	CRY
[Minuartia nuttallii]		
Arenaria rubella	Boreal sandwort	CRY
[Minuartia rubella]		
Arnica cordifolia	Heartleaf arnica	AST
Arnica fulgens	Orange arnica	AST
Arnica mollis	Hairy arnica	AST
Artemisia dracunculus	Tarragon	AST
Artemisia ludoviciana	Louisiana sagewort	AST
! Asperugo procumbens	Madwort	BOR
Aster ascendens	Long-leaved aster	AST
Aster foliaceus	Leafybract aster	AST
Aster glaucodes	Blueleaf aster	AST
Astragalus agrestis	Field milkvetch	FAB
Astragalus alpinus	Alpine milkvetch	FAB
Astragalus argophyllus var. argophyllus	Silver-leaved milkvetch	FAB
Astragalus bisulcatus var. bisulcatus	Two-grooved milkvetch	FAB
Astragalus chamaeleuce	Cicada milkvetch	FAB
Astragalus diversifolius var. campestris	Lesser rushy milkvetch	FAB
[Astragalus convallarius]	-	
Astragalus drummondii	Drummond milkvetch	FAB
Astragalus kentrophyta	Thistle milkvetch	FAB
Astragalus miser var. decumbens	Sagebrush weedy milkvetch	FAB
Astragalus missouriensis	Missouri milkvetch	FAB
Astragalus purshii	Pursh milkvetch	FAB
Balsamorhiza incana	Hoary balsamroot	AST
Balsamorhiza sagittata	Arrowleaf balsamroot	AST
Balsamorhiza x tomentosa	Tomentose balsamroot	AST
[hybrid between sagittata x incana]		
Besseya wyomingensis	Wyoming kittentails	SCR

Calochortus nuttallii	Sego lily	LIL
! Camelina microcarpa	Littleseef flaseflax	BRA
Campanula rotundifolia	Harebell	CAM
! Capsella bursa-pastoris	Common shepherd's purse	BRA
Castilleja angustifolia	Narrowleaf paintbrush	SCR
Castilleja flava	Yellow paintbrush	SCR
Castilleja linariifolia	Wyoming paintbrush	SCR
Cerastium arvense	Field chickweed	CRY
Chaenactis douglasii var. montana	Douglas dustymaiden	AST
Chenopodium atrovirens	Mountain goosefoot	CHN
<i>Chenopodium capitatum var. parvicapitatum</i>	Smallhead goosefoot	CHN
[Chenopodium overi]	C	
Chimaphila umbellata var. occidentalis	Common pipsissewa	ERI
! Chorispora tenella	Blue mustard	BRA
! Cirsium arvense	Canada thistle	AST
Cirsium pulcherrimum	Beautiful thistle	AST
Cirsium scariosum	Elk thistle	AST
! Cirsium vulgare	Bull thistle	AST
Claytonia lanceolata	Springbeauty	POR
Clematis ligusticifolia	Western virgin's bower	RAN
Collinsia parviflora	Small-flowered blue-eyed Mary	SCR
Collomia linearis	Narrowleaved collomia	PLM
Comandra umbellata var. pallida	Pale bastard toad-flax	SAN
! Convolvulus arvensis	Field bindweed	CNV
Corallorrhiza maculata	Spotted coral-root	ORC
Crepis acuminata	Long-leaved hawksbeard	AST
Crepis atribarba	Slender hawksbeard	AST
Crepis modocensis	Siskiyou hawksbeard	AST
Crepis occidentalis var. costata	Western hawksbeard	AST
Cryptantha celosioides	Cockscomb cryptantha	BOR
Cuscuta sp.	Dodder	CNV
Cymopterus acaulis	Plains spring-parsley	API
Cymopterus longilobus	Mountain spring-parsley	API
Cymopterus terebinthinus var. albiflorus	Turpentine spring-parsley	API
! Daucus carota	Queen Anne's lace	API
Delphinium bicolor	Little larkspur	RAN
Delphinium geyeri	Geyer's larkspur	RAN
Descurainia incana var. incana	Mountain tansymustard	BRA
! Descurainia sophia	Flixweed	BRA
Disporum trachycarpum	Wartberry fairybells	LIL
Dodecatheon pulchellum	Darkthroat shooting-star	PRM
Dracocephalum parviflorum	American dragonhead	LAM
Draba albertina	Slender draba	BRA

Draba oligosperma var. oligosperma	Few-seeded draba	BRA
Epilobuium angustifolium	Fireweed	ONA
Épilobium brachycarpum	Panicled willow-herb	ONA
Erigeron caespitosus	Tufted fleabane	AST
Erigeron compositus var. discoideus	Cut-leaved fleabane	AST
Erigeron corymbosus	Foothill daisy	AST
Erigeron eatonii	Eaton's daisy	AST
Erigeron glabellus	Smooth daisy	AST
Erigeron ochroleucus	Buff fleabane	AST
Eriogonum flavum var. flavum	Yellow buckwheat	PLG
Eriogonum heracleoides	Wyeth buckwheat	PLG
Eriogonum ovalifolium	Cushion buckwheat	PLG
Eriogonum umbellatum var. majus	Sulfur buckwheat	PLG
Erysimum asperum	Western wallflower	BRA
Erysimum inconspicuum	Small wallflower	BRA
Euphorbia brachycera var. robusta	Rocky Mountain spurge	EUP
! Euphorbia esula	Leafy spurge	EUP
Fragaria virginiana	Virginia strawberry	ROS
Fritillaria atropurpurea	Leopard-lily	LIL
Galium aparine	Cleavers	RUB
Galium bifolium	Twinleaf bedstraw	RUB
Gaura coccinea	Scarlet gaura	ONA
Gayophytum sp.	Groundsmoke	ONA
Geranium viscosissimum	Sticky geranium	GER
Geum macrophyllum var. perincisum	Large-leaved avens	ROS
Geum triflorum	Prairie-smoke	ROS
Glycyrrhiza lepidota	Licorice root	FAB
Grindelia squarrosa	Curly-cup gumweed	AST
Gutierrezia sarothrae	Broom snakeweed	AST
Habenaria hyperborea	Northern green bog-orchid	ORC
[Platanthera hyperborea]		
Haplopappus acaulis	Stemless goldenweed	AST
Haplopappus armerioides	Thrift goldenweed	AST
Haplopappus nuttallii	Gumweed aster	AST
Hedysarum occidentale	Western sweetvetch	FAB
Heracleum sphondylium var. lanatum	Cow parnsip	API
Heterotheca fulcrata	Hairy golden-aster	AST
Heuchera parvifolia	Littleleaf alumroot	SAX
Hieracium albiflorum	White-flowered hawkweed	AST
Hieracium cynoglossoides	Hound's tongue hawkweed	AST
Hydrophyllum capitatum	Ballhead waterleaf	HYD
Hymenopappus polycephalus	Manyheaded woollywhite	AST
Hymenoxys acaulis	Stemless hymenoxys	AST

Hymenoxys richardsonii var. richardsonii	Richardson's hymenoxys	AST
Ipomopsis aggregata	Scarlet-gilia	PLM
Ipomopsis spicata	Spicate gilia	PLM
Iris missouriensis	Rocky Mountain iris	IRI
! Lactuca serriola	Prickly lettuce	AST
Lappula redowskii var. redowskii	Western stickseed	BOR
Lathyrus eucosmus	Seemly sweetpea	FAB
Lesquerella alpina var. alpina	Alpine bladderpod	BRA
Lesquerella fremontii	Fremont bladderpod	BRA
Lewisia pygmaea	Pygmy bitterroot	POR
Lewisia rediviva	Bitterroot	POR
Linum lewisii	Blue flax	LIN
Lithophragma glabrum var. ramulosum	Bulblet woodland-star	SAX
Lithospermum incisum	Yellow gromwell	BOR
Lithospermum ruderale	Western gromwell	BOR
Lomatium cous	Cous biscuitroot	API
Lomatium dissectum var. multifidum	Fern-leaved biscuitroot	API
Lomatium macrocarpum	Big-seed biscuitroot	API
Lomatium orientale	Eastern biscuitroot	API
Lomatium triternatum var. platycarpum	Nineleaf biscuitroot	API
Lupinus argenteus	Silvery lupine	FAB
Lupinus lepidus var. utahensis	Prairie lupine	FAB
Lupinus polyphyllus var. humicola	Wyeth's lupine	FAB
Maianthemum stellatum	Starry false Solomon's-seal	LIL
Machaeranthera canescens	Hoary aster	AST
! Medicago lupulina	Black medic	FAB
! Medicago sativa	Alfalfa	FAB
! Melilotus officinalis	Yellow sweetclover	FAB
Mentha arvensis var. canadensis	Field mint	LAM
Mertensia ciliata	Ciliate bluebells	BOR
Mertensia oblongifolia	Oblong bluebells	BOR
Mertensia viridis	Greenleaf bluebells	BOR
Microseris nutans	Nodding microseris	AST
Microsteris gracilis var. humilior	Pink microsteris	PLM
Mimulus guttatus	Yellow monkeyflower	SCR
Nemophila breviflora	Great Basin nemophila	HYD
Nothocalais nigrescens	Black-hairy microseris	AST
Oenothera cespitosa	Tufted evening-primrose	ONA
Opuntia polyacantha var. polyacantha	Plains prickly-pear	CAC
Orobanche uniflora	One-flowered broomrape	ORO
Orthilia secunda	Sidebells pyrola	ERI
Orthocarpus luteus	Yellow owl-clover	SCR
Osmorhiza chilensis	Mountain sweet-cicely	API

Osmorhiza depauperata	Blunt-fruit sweet-cicely	API
Oxytropis sericea	Silky locoweed	FAB
Penstemon attenuatus var. pseudoprocerus	Taper-leaved beardtongue	SCR
Penstemon eriantherus	Fuzzytongue beardtongue	SCR
Penstemon glaber var. glaber	Glabrous beardtongue	SCR
Penstemon humilis	Low beardtongue	SCR
Penstemon laricifolius	Larch-leaved beardtongue	SCR
Penstemon paysoniorum	Payson's beardtongue	SCR
Penstemon procerus	Littleflower beardtongue	SCR
Penstemon radicosus	Matroot beardtongue	SCR
Penstemon strictus	Straight beardtongue	SCR
Perideridia montana	Mountain yampah	API
Phacelia hastata	Silverleaf phacelia	HYD
Phacelia sericea	Silky phacelia	HYD
Phlox hoodii	Hoods phlox	PLM
Phlox longifolia	Long-leaf phlox	PLM
Phlox multiflora	Many-flowered phlox	PLM
Phlox pungens	Beaver Rim phlox	PLM
Physaria saximontana var. saximontana	Rocky Mountain twinpod	BRA
Plantago patagonica	Indian-wheat	PTG
Polygonum amphibium	Water swartweed	PLG
Polygonum bistortoides	Alpine bistort	PLG
Polygonum douglasii	Douglas' knotweed	PLG
Polygonum minimum	Dwarf knotweed	PLG
Polygonum sawatchense	Sawatch knotweed	PLG
Potentilla arguta	Glandular cinquefoil	ROS
Potentilla concinna var. concinna	Early cinquefoil	ROS
Potentilla gracilis var. elmeri	Elmer's cinquefoil	ROS
Potentilla gracilis var. nuttallii	Slender cinquefoil	ROS
Potentilla hippiana	Woolly cinquefoil	ROS
! Potentilla norvegica	Norwegian cinquefoil	ROS
Potentilla ovina var. ovina	Sheep cinquefoil	ROS
Pterospora andromeda	Pinedrops	ERI
Ranunculus glaberimmus var. ellipticus	Sagebrush buttercup	RAN
Ranunculus macounii	Macoun's buttercup	RAN
! Ranunculus testiculatus	Male buttercup	RAN
Rorippa calycina	Persistent sepal yellowcress	BRA
! Rumex crispus	Curly dock	PLG
Rumex paucifolius	Mountain sorrel	PLG
Saxifraga rhomboidea	Diamondleaf saxifrage	SAX
Sedum lanceolatum	Lance-leaved stonecrop	CRS
Senecio canus	Woolly groundsel	AST
Senecio integerrimus var. exaltatus	Western groundsel	AST

Senecio pauperculus	Balsam groundsel	AST
Senecio sphaerocephalus	Mountain-marsh groundsel	AST
Senecio streptanthifolius	Cleft-leaved groundsel	AST
Silene drummondii	Drummond campion	CRY
Silene menziesii	Menzies' catchfly	CRY
! Sisymbrium altissimum	Tumblemustard	BRA
Solidago canadensis	Canada goldenrod	AST
Solidago multiradiata var. scopulorum	Northern goldenrod	AST
Solidago nana	Low goldenrod	AST
Sphaeralcea coccinea	Scarlet globernallow	MLV
Śwertia radiata	Green gentian	GEN
[Frasera speciosa]	C	
! Taraxacum laevigatum	Smooth dandelion	AST
! Taraxacum officinale	Common dandelion	AST
Thalictrum fendleri	Fendler meadow-rue	RAN
Thermopsis rhombifolia	Round-leaved goldenpea	FAB
! Thlaspi arvense	Field pennycress	BRA
Thlaspi parviflorum	Small flowered pennycress	BRA
Townsendia hookeri	Hooker's Easter-daisy	AST
Townsendia parryi	Parry's Easter-daisy	AST
Townsendia spathulata	Swordleaf Easter-daisy	AST
! Tragopogon dubius	Yellow salsify	AST
Trifolium andinum	Andean clover	FAB
Trifolium barnebyi	Barneby's clover	FAB
Trifolium gymnocarpon	Hollyleaf clover	FAB
! Trifolium hybridum	Alsike clover	FAB
! Trifolium repens	White clover	FAB
Urtica dioica var. procera	Stinging nettle	URT
Veronica americana	American speedwell	SCR
Vicia americana	American vetch	FAB
Viola adunca	Early blue violet	VIO
Viola nephrophylla	Northern bog violet	VIO
Viola nuttallii	Yellow prairie violet	VIO
Viola praemorsa var. altior	Upland yellow violet	VIO
Viola purpurea var. venosa	Goosefoot violet	VIO
Viola vallicola	Valley yellow violet	VIO
Zigadenus elegans	Mountain death-camas	LIL
Zigadenus venenosus var. gramineus	Meadow death-camas	LIL
Graminoids		
! Agropyron cristatum	Crested wheatgrass	POA
! Agrostis stolonifera	Redtop	POA
! Alopecurus pratensis	Meadow foxtail	POA

! Arrhenatherum elatius	False oatgrass	POA
Bromus carinatus	California brome	POA
! Bromus commutatus	Hairy brome	POA
! Bromus inermis var. inermis	Smooth brome	POA
! Bromus tectorum	Cheatgrass	POA
Calamagrostis montanensis	Plains reedgrass	POA
Carex aquatilis	Water sedge	CYP
Carex aurea	Golden sedge	CYP
Carex douglasii	Douglas sedge	CYP
Carex filifolia	Thread-leaved sedge	CYP
Carex hoodii	Hoods sedge	CYP
Carex lanuginosa	Woolly sedge	CYP
Carex microptera	Smallwing sedge	CYP
Carex nebrascensis	Nebraska sedge	CYP
Carex petasata	Liddon's sedge	CYP
Carex praegracilis	Clustered field sedge	CYP
Carex praticola	Meadow sedge	CYP
Carex rossii	Ross' sedge	CYP
Carex rostrata	Beaked sedge	CYP
[Carex utriculata]	6	
Carex stenophylla	Narrow-leaved sedge	CYP
Carex vallicola	Valley sedge	CYP
Danthonia unispicata	Onespike oatgrass	POA
Deschampsia cespitosa	Tufted hairgrass	POA
Elymus albicans var. griffithsii	Griffiths' wheatgrass	POA
Elymus cinereus	Basin wildrye	POA
[Leymus cinereus]	2	
Elymus elymoides	Bottlebrush squirreltail	POA
[Sitanion hystrix]	1	
Elymus glaucus	Blue wildrye	POA
Elymus smithii	Western wheatgrass	POA
[Pascopyrum smithii]	C C	
Elymus spicatus	Bluebunch wheatgrass	POA
[Pseudoroegneria spicata]	C	
Elymus trachycaulus var. andinus	Awned slender wheatgrass	POA
Elymus trachycaulus var. trachycaulus	Slender wheatgrass	POA
Festuca idahoensis	Idaho fescue	POA
Festuca saximontana	Sheep fescue	POA
[Festuca ovina var. rydbergii]	•	
Hordeum brachyantherum	Meadow barley	POA
Hordeum jubatum	Foxtail barley	POA
Juncus balticus var. montanus	Baltic rush	JUN
Juncus longistylis	Long-styled rush	JUN

Koeleria macrantha	Prairie junegrass	POA
Leucopoa kingii	King spikefescue	POA
Melica bulbosa	Oniongrass	POA
Melica spectabilis	Showy oniongrass	POA
Muhlenbergia cuspidata	Plains muhly	POA
Oryzopsis hymenoides	Indian ricegrass	POA
Phragmites australis	Common reed	POA
Poa cusickii var. cusickii	Cusick's bluegrass	POA
Poa cusickii var. epilis	Skyline bluegrass	POA
Poa fendleriana	Muttongrass	POA
Poa nervosa var. wheeleri	Wheeler bleugrass	POA
Poa palustris	Fowl bluegrass	POA
! Poa pratensis	Kentucky bluegrass	POA
Poa secunda	Sandberg bluegrass	POA
Stipa comata var. intermedia	Needle-and-thread	POA
Stipa lettermanii	Letterman's needlegrass	POA
Stipe nelsonii	Nelson's needlegrass	POA
Stipa occidentalis	Western needlegrass	POA
Stipa pinetorum	Pine needlegrass	POA
Trisetum spicatum	Spike trisetum	POA
Trisetum wolfii	Wolf trisetum	POA
Ferns and Fern Allies		
Cystopteris fragilis	Bladder fern	ASL
Equisetum arvense	Field horsetail	EQU
Equisetum laevigatum	Smooth horsetail	EQU
Selaginella densa	Dense spike-moss	SEL
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Appendix B.

Element Occurrence Records and Location Maps of Rare Plant Species of Red Canyon Ranch