

Red Canyon Ranch
Lander, Wyoming



ECOLOGICAL MANAGEMENT PLAN

2009

Land Management Plan January 2001 (Revised 6 Nov 2008)

Red Canyon Ranch is located 15 miles south of Lander, Wyoming, and is a project of The Nature Conservancy, established in December 1993. The ranch is a representative mixture of land ownerships, including approximately 5,000 acres of deeded land, 15,000 acres of Bureau of Land Management permits, 3,000 acres State of Wyoming lease, and 30,000 acres of U.S. Forest Service permits. The goal of the project is to show compatibility between ranching and conservation, to test management practices, which may offer profitability to other ranching operations, and to conserve rare plants, wildlife habitats, riparian areas and wetlands, and native upland communities in the Southern Wind River mountain range.

This Land Management Plan is the result of a constantly evolving process, and is built upon the fundamentals of Coordinated Resource Management (CRM) in Wyoming. The original land management plan was developed in 1994 by a technical review team, and is updated annually by the ranch manager, with review by members of the team. A three-part goal for the ranch was developed in 1994, using Holistic Resource Management (HRM) guidelines. At the same time, The Nature Conservancy described priorities to guide management of the project on a broad scale. The goal for the ranch is listed as “temporary,” and is flexible. The goal and other operational concerns are revisited annually by the Coordinated Resource Management team.

The Technical Review Team developed a pasture-by-pasture listing of vegetative objectives, ecological concerns, and management considerations at its first meeting (16-17 February 1995). These serve as a basis for continued planning for management. Each pasture is viewed as an individual ecological unit, without regard to land ownership or traditional uses, and management focuses on maintaining ecological function for the whole area. As a result, the primary function of this planning is to establish a means of planning grazing which has both ecological and economic integrity.

As the ranch adapts to changes and evolves, numerous additions have been made to the planning process, including a fire plan, and recreation and road planning. Additional attachments include a completed plant species list done by the Wyoming Natural Diversity Database (WYNDD), and results from monitoring by Red Canyon Ranch, BLM, U.S. Forest Service, and others.

RED CANYON RANCH
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(As of January 18, 2011)

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TEMPORARY HOLISTIC GOAL

(Original Red Canyon CRM 18 October 1994; Amended 25 March 1996 and 6 November 2008)

Purpose: To sustain biological diversity by balancing economic, ecological, and social well being

The Whole: **Core Management:** Managers, TNC, Forest Service; Bureau of Land Management; Game and Fish; Weed and Pest; Extension; Natural Resource Conservation Service; Conservation District; Staff/Interns; Partners, Customers and Neighbors/Landowners

Resource Base: People, county planners, recreationists, schools, neighbors, visitors, suppliers, clients, universities, environmentalists, community, businesses, donors, media, ranchers, wildlife, soil, plants, infrastructure, information, water

Money: Donations, income from livestock and forage, grants, value of people's time, tourism, recreation, education, partner matching project dollars, development of business plan

Quality of Life:
(values) Wide-open space with abundant wildlife and diverse habitats. Intellectual and overall tolerance and respect for diversity of people and views. Prosperity, continuity and sustainability. Healthy families, fun, humor and enjoyment in a safe and secure environment. Healthy functioning environment, clean water, air and food. Self-sustaining, truly participatory community with accountability and responsibility. Leisure and personal time with freedom to enjoy it personally. Solitude and privacy with a sense of intimacy in a community. Human use and population in balance with environment and resources. Honesty, integrity, collaboration and moral courage. Good education producing creative people with well-rounded and broad knowledge. Truly wild places. Friendliness, love and caring. Regulation. Proactive people making things happen. Caring for the land and feeling good about how we do that. Access in harmony with defined values. Respect and responsibility for private land. Sustained western ranching culture. Healthy, fully functional environment. Successful example of the balancing of ranching and biodiversity.

Forms of Production:

1. Revenue from activities that can be carried out in a sustainable manner, not in conflict with our values.
2. Knowledge, training and educational opportunities.
3. An atmosphere conducive to collaboration, accountability, trust, responsiveness and personal growth.
4. A project which inspires philanthropic support.
5. Revenue from production of vegetation.
6. Environment for risk taking which encourages support and involvement.

Future Resource Base:

People: We should strive to be honest, trustworthy, positive and proactive, basing our decisions on the best information available. We will be practical, open-minded and effective, sharing our successes and failures equally in a humble manner. We will be dedicated and caring about our community and project these values beyond our borders. TNC Staff.

Working environment: We will have a working environment that is safe, enjoyable, clean, healthy and efficient. It will be inspirational, valuing flexibility, risk taking, learning and collaboration.

Living environment: Comfortable and functional with sufficient privacy, and compatible with the environment.

Land: The land will be an open healthy environment with properly functioning physical and biological processes.

PRIORITIES FOR RED CANYON RANCH

(Adopted 14 February 1995; Amended 6 November 2008)

1. ENHANCEMENT OF BIOLOGICAL DIVERSITY

This is the mission of The Nature Conservancy, and guides management decisions. Primary biological values at Red Canyon include rare plants, representative plant communities, wildlife habitats, riparian habitats, and wetlands. Monitoring is a major priority, and sound science is a cornerstone of The Nature Conservancy's goal. Develop monitoring and data plans to guide objectives, give guidance, and make decisions to produce a better end product.

2. GRAZING MANAGEMENT

A primary focus of the ranching operation is to test alternatives and showcase compatibility between livestock grazing and enhancement of biological diversity. Grazing management is the main component of this program. Best Management Practices are being implemented.

3. EDUCATION AND OUTREACH

Red Canyon Ranch is uniquely positioned to interact with a variety of audiences, including K-12 education, university internships, research, demonstrations, field tours, and other efforts involving both the ranching community and conservation groups. This includes economic and ecologic pursuits. The Nature Conservancy is not an educator but can provide the Ranch landscape as a classroom or tool.

4. RESEARCH

The ranch offers significant research potential, and while that has been increasing on a steady basis, research has not been fully realized. We will work with any reputable research entity to enhance the scientific pursuits available at the ranch.

5. OPERATIONS AND LIVESTOCK MANAGEMENT

Ranch facilities and management of livestock are critical elements of our ability to educate, communicate, and perform the tasks outlined in the goals previously mentioned.

6. RECREATION

Recreational opportunity is being provided at the present time. Better management needs to be considered.

LITTLE POPO AGIE ALLOTMENT

The Little Popo Agie Allotment contains a wide diversity of vegetative range sites because of its size and wide range of soils. Major range sites are combined and portrayed below.

Vegetation Types and Common Plant Species

Sagebrush-Mixed Grass - (30%)

Wyoming Sagebrush	Black Sagebrush
Rabbitbrushes	Needleandthread Grass
Indian Ricegrass	Threadleaf Sedge
Western Wheatgrass	Bluebunch Wheatgrass
Mutton Bluegrass	Idaho Fescue
King-Spike Fescue	Prairie Junegrass
Kentucky bluegrass	Balsamroot

This group of sagebrush range sites is an important source of forage for livestock, and wildlife. Many small game species make extensive use of this area. Particularly important are the natural perennial and intermittent watercourses. They are highly favored by large and small game, non-game animals and domestic livestock.

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Conifer Woodland - (10%)

Lodgepole Pine	Limber Pine
Subalpine Fir	Douglas Fir
Grouse Whortleberry	Creeping Juniper
Pinegrass	Needlegrass
Kinnikinnick	Heartleaf Arnica
Utah Juniper	

These range sites are important even though small in relation to the whole area. There is limited forage potential, but these sites provide escape and thermal cover for wildlife which reside in the surrounding area. The edge effect associated with these range sites also provides shade and shelter for livestock, and wildlife. These range sites provide the core of cover for spring-summer-fall range for most of the elk and mule deer using the area.

Riparian Zones and Meadows - (5%)

Willow (various species)	Waterbirch
Aspen	Cottonwood
Nebraska Sedge	Tufted Hairgrass
Beaked Sedge	Northern Reedgrass
Kentucky Bluegrass	Cattail
Bullrush	Redtop
Rose	Shrubby Cinquefoil

Though small in terms of total area, these range sites are highly important. They produce high quality and quantities of forage with a wide diversity in species composition. These sites are highly favored by domestic livestock and wildlife. This is due to high plant diversity and presence of live water on these sites. These areas are the most heavily utilized within the area. These range sites and the Aspen - Woodland sites are essential components of the beaver-pond ecosystems and closely interrelated with the stream and pond aquatic habitats.

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Aspen Woodland - 5%

Aspen	Creeping Juniper
Buffalo Berry	Oregon Grape
Snowberry	Elk Sedge
Needlegrass	Wildrye
Bluegrass	

Though small in area these sites provide important transitional areas along riparian zones between upland range sites. In addition to forage provided these sites provide escape cover and solitude for wildlife. The edge effect associated with these range sites also provides shelter and shade for livestock. The vertical structural diversity found provides habitat for many avian species.

Mountain Shrubland - (50%)

Wyoming Sagebrush	Chokecherry
Three Tip Sagebrush	Bitterbrush
Snowberry	Snowbush Ceanothus
Currant	Oceanspray
Idaho Fescue	King-spike Fescue
Mutton Bluegrass	Needlegrass
Kentucky Bluegrass	Western Wheatgrass
Bluebunch Wheatgrass	Letterman Needlegrass
Balsamroot	

These range sites are important. The high component of shrubs in this community make the range sites a highly important forage source for big game, and many small mammals. These range sites are highly favored by large and small game, non-game animals and livestock. Many of these sites are highly important as big game winter range for deer and elk.



Little Popo Agie Complex AMP

The Little Popo Agie Complex AMP contains 9,455 acres of public land and 3,786 acres of state and private lands. The terrain in the complex rises steeply from east to west. Elevations range from 5,600 feet to 8,500 feet. Barrett Creek, Deep Creek, Cherry Creek, and the little Popo Agie River are live water sources. Soils in the allotment are generally formed in the parent materials derived from the Chugwater formation, Tensleep sandstone, Amsden formation, and Madison limestone. The complex includes summer range for antelope, deer, elk, moose and bighorn sheep. The complex also includes crucial winter range for elk, bighorn sheep, mule deer and moose.

Detailed range site information is available for the Little Popo Agie allotment portion of the complex. The following narratives by pasture unit contain vegetative descriptions of existing vegetation and potential desired plant communities and goals for those communities.

Forest Service Allotments AMP's

The Ed Young Basin allotments portion of the CRM contains 29,700 acres of National Forest land that ranges in elevations from 7000 to 9200 feet. These allotments are Ed Young Basin, Bayer Mountain, Maxon Basin and South Pass. The Ed Young Basin / Bayer Mountain AMP was completed in 2005 and the Maxon Basin / South Pass AMP was completed in 2008. These documents contain information as to the conditions and management of these allotments.

Detailed range site information is available for this allotment portion of the complex. The following narratives by pasture unit contain vegetative descriptions of existing vegetation and potential desired plant communities and goals for those communities.

LONG-TERM GRAZING PLAN (Adopted 1999)

Grazing Practice Narrative

All pastures are grazed by cattle, primarily cows and calves. Livestock within the Little Popo Agie complex of allotments, and the Ed Young Basin allotments will be generally run in one herd, specific to the kind of livestock and in compliance with the prescribed grazing system.

Prescribed Grazing Practice

The pastures within the CRM complex of allotments will be grazed in a more time controlled manner than in the past (season-long grazing since 1968). Cattle will be concentrated to the extent water availability will allow. Timing of grazing will depend on key species and objectives for individual pastures. Time spent within each pasture will depend on utilization of key species and grazing impact on the vegetative community. The Following table displays the annual grazing rotations as set by the Grazing TRT Showing order of use and pastures rested.

YEAR

Pasture	08	09	10	11	12	13	14	15	16	17	18
Red Canyon Meadows	R	12	1								
Game & Fish Meadows	3	*	2								
WG & F State Lands	3	*	3								
Lower Orchard Draw	14	1	R								
Upper Orchard Draw	14	1	R								
Tub Spring	13	2	R								
Barrett Slope	13	3	R								
Greenough	1	12	1								
Deep Creek	2	12	13								
Pine Springs	4	11	12								
Dry Lake	5	10	4								
Cherry Creek	12	R	11								
South Pass (w/Mine lease)	6	9	5								
Maxon Basin	8	7	6								
Bayer Mountain	9	R	7								
Ed Young	R	4	10								
Riparian	10	6	8								
Snow Creek	11	5	9								
Pass Creek	7	8	R								

Annual Rotations as determined by the Grazing TRT.

Red Canyon Creek Riparian Area - These pastures will be used for breed up of females with respective bull preference and as a late Fall reserve. Grazing will be monitored to leave a 4" - 6" inch stubble height at all times. Regrowth will be monitored on pastures designated for spring and fall use, and grazing time will be limited to less than 25 days. Moves from one pasture to another will be determined by monitoring key species use and grazing impact on the vegetative community.

Flexibility is needed to insure success of the grazing system. Deferment will be based upon the following criteria:

- A. Seed ripe date of 7/15 to 8/15 for the key grass species.
- B. Range readiness date of 5/15 to 6/26.
- C. Target utilization levels of 50% or less on key herbaceous management species and areas. Target utilization levels of 40 - 45 percent on key browse species. Intensive use supervision and utilization checks and mapping by BLM, FS and the permittee will determine use patterns and utilization on key species
- D. Annual variations in climatic and forage conditions.

Grazing Treatments

Treatment A - Defer until after seed-ripe, then graze. This will occur on selected pastures within the Little Popo Agie complex of allotments yearly. Under this treatment, the pasture is rested until seed-ripe of the key forage species (approximately July 15 - August 30). At this time, most plants grazed by livestock have produced a mature seed that would, if planted, germinate under proper climatic and seed-bed conditions, after the end of the grazing season. Spring deferment will occur every other year to provide for range readiness of the key forage species.

Treatment B - Hot grazing season deferment, then graze. Under this treatment, livestock will graze the area after vegetative development has occurred. About 4-6 inches of stubble height on herbaceous riparian vegetation should be left standing. This treatment should allow for an improving riparian condition.

Treatment C - Graze until seed-ripe, then rest. Under this treatment, livestock graze from the start of the grazing season until seed-ripe of the key forage species (approximately July 15 - August 15). This will allow for any late season regrowth of key forage species and storage of important carbohydrates in the root systems for spring growth. This treatment should help maximize livestock production.

Treatment D - Rest. Under this treatment, no grazing will occur. Vegetative growth will achieve full production and plants will recover from previous years grazing. This should result in improved plant vigor and production.

Flexibility

Flexibility in this AMP only refers to the specific latitudes within which the permittee can modify grazing use without additional authorization. In cases such as wildfire, insect infestation, drought, or other such emergencies, the grazing practice may need to be adjusted or livestock may need to be removed from the allotment entirely. The prescribed grazing practice is flexible enough to accommodate adjustments that may be needed to address these problems. Flexibility in turnout dates will occur if phenology data indicates that turnout date prior to or after May 20 is appropriate. A 50 percent utilization guideline will be used at key management areas to indicate timing of movement of livestock. Livestock may be moved into any area of the allotment where 50 percent utilization has not been attained. Actual use billing will be allowed with the AMP for ease of livestock operations and BLM grazing administration. As the AMP becomes fully operational and desired results are being achieved, increased flexibility would likely occur.

Livestock Control

The grazing plan prescribed in the AMP requires livestock to be grazed in specified areas between certain dates. The livestock operators will be required to keep livestock in certain pastures or areas of pastures as prescribed by the grazing plan or as utilization levels increase. Whatever amount or frequency of riding or herding is required; it is the responsibility of the livestock operators to keep their livestock in the prescribed pastures or areas and to meet target utilization levels. It is realized that livestock drift will occur and that livestock operators will make a diligent effort to remove livestock within 3 days after notification of a problem or a specific agreed-upon number of days

Salt, Mineral Supplement and Supplemental Feeding

Salt and mineral supplement may be placed on public lands. The locations where these supplements are placed should enhance management and improve distribution of grazing animals. Initially, minimum distance from water will be 1/4 mile. Location and rotation of placement sites would change annually. Supplemental feeding of livestock on public land is not allowed without prior approval of the agency. The permittee must make application for supplemental feeding on a case by case basis. The request will be evaluated and either approved, approved with certain stipulations or modifications, or rejected.

Monitoring

Intensive monitoring studies were initiated on the Little Popo Agie AMP in 1968 and will continue as the AMP is implemented. These studies are for measuring the degree of accomplishment of management objectives as previously discussed. Monitoring in the Ed Young Allotments was initiated in the 1950's and is used to make management decisions based on objectives and ecological conditions.

Distribution Patterns

Through field inspections, BLM, FS and the permittee will observe and record the locations of livestock and utilization levels. Each winter the grazing team of the CRM will discuss livestock distribution patterns and utilization zones in terms of light, moderate and heavy grazing use levels, and adjust livestock grazing management accordingly the next year.

Condition and Trend

Several different methods are currently being used to measure range condition and trend. Trend studies are located at each key management area. This data will be used to measure the success of the management objectives. The permittee is encouraged to assist in the establishment, collection, analysis and interpretation of trend study transect's and their results.

Utilization

Utilization data will be collected in two ways: 1) mapped observations of distribution and utilization patterns throughout the allotment; 2) actual measurement of utilization by species within the key management areas, using the height-weight method, for herbaceous plants or the landscape appearance method for herbaceous and browse. Forage utilization data will be gathered during the grazing season to manage livestock distribution and movement within the pasture. It will also be collected at the end of the grazing season to determine total utilization by all grazing animals by pasture. This data will be used collectively with condition and trend data, water availability, annual forage production to fine tune the grazing practice, aid in evaluation, and assist in decision making for year to year grazing practice adjustments and flexibility. Joint, on-the-ground meetings will be used for making pasture adjustments.

Precipitation

Precipitation will be the key element in monitoring climate. Range and forage conditions must be viewed in contrast with recent precipitation patterns, in order to make an accurate evaluation of management effectiveness. It is imperative that forage productivity changes be measured while considering local precipitation amounts.

Evaluation

At the conclusion of every other grazing cycle, every six years after implementation of this AMP or sooner if sufficient data is available, an evaluation report will be completed. The purpose of this evaluation will be to determine the effectiveness of the allotment management plan in meeting the objectives. The primary study methods utilized in the evaluation are actual use, utilization, trend and climate. Secondary methods such as photo points, range readiness, study exclosure data, and range condition may also be used in completing the evaluation. Observations by BLM and FS personnel and the permittee of what has taken place on the allotment are also important.

It may be necessary to update or revise this plan as needed. Monitoring studies may indicate that a change in the grazing system is required to meet management objectives. As more data are gathered it may become apparent that some objectives need revision. The fact that these changes or revisions may be necessary is recognized by both federal agencies and the Permittee.

BILL'S MEADOW

Description: Irrigated meadow with steep sidehill slopes, native upland vegetation on the East Side of Red Canyon Road. The pasture is bisected by a county road, which receives extensive travel during summer. Red Canyon Creek is fenced into a riparian pasture (1995) for the full length of this pasture. The pasture includes two meadows, Bill's and Cinnamon's.

Acreage: 200 ac
Elevation: 5700-5800 ft

Vegetation: Meadows dominated by smooth brome, intermediate wheatgrass, and volunteer alfalfa. Uplands mixed black sage, big sage, fringed sage and silver sage, sumac, chokecherry, juniper, wheatgrasses, and cheat grass. Recently, needle and thread, Indian ricegrass, green needlegrass, threadleaf sedge, and some kingspike fescue have appeared, along with some very dense stands of basin wildrye. Seasonal variations lead to occasional outbursts of larkspur, broom snakeweed and sweet clover. Ditches and ephemeral draws are mixed sumac, chokecherry, and willow. There is a limited presence of leafy spurge, but most of that appears to be the result of seeds in hay, and should be contained.

Condition: Meadows are in the process of being converted from smooth brome/intermediate wheat/alfalfa to a stronger component of alfalfa. Bare ground has been reduced significantly, both in irrigated portions and native uplands. Uplands have gone from less than desirable condition to a greater diversity of plants, especially cool season grasses, with considerably less bare ground.

Desired Condition: Spring and Winter forage production in meadow; maintain mix of native species on uplands, maintain soil integrity in uplands by increasing perennial grasses; increase vigor of woody browse species.

Key Species: Antelope bitterbrush and black sage are highly desirable winter browse species for wildlife.

Monitoring: Three photo points were established on upland sites in 1995, re-taken 1998; tonnage of hay production; professional judgment and animal-days use.

Management: Grazing in early spring to decrease cheat grass (10-60 days). This pasture is used for calving due to heat retention by red rocks, water and proximity to ranch headquarters. Haying has been integrated into the meadow component.

Fire: No fire is planned in this pasture at this time.

Invasive Species: There are two small patches of Leafy spurge, which have been treated with Weedmaster for the past two years. Both appear to be declining in vigor and size. Other invasive species are not seen as a major concern.

Hay Production:

	1994	1995	1996	1997	1998	1999	2000	2001	2002
	0	20	0	0	107	102			

Improvements: Irrigation systems have been repaired and enhanced with pipe delivery systems from the headgate to the meadow, and gated pipe at the lower end of the field. A small reservoir (1996) as a sediment trap and water source for livestock and wildlife has been developed at the upper end of the pasture, and tree plantings have been done in association with the reservoir. An additional small sediment trap was added in 1998. A dryland meadow at the extreme upper (South) end of the pasture was seeded in April 1997, and irrigation systems were completed in 1998; this system is surface pipe delivery, and ditch irrigation. The hay corral was rebuilt in 1998. Addition of small ponds in association with irrigation systems is in progress. Future improvements include complete installation of gated pipe for irrigation.

Wildlife: This pasture holds high wildlife values, especially for wintering mule deer, raptors, and small birds. Transitional range exists for antelope, moose, and elk. A major objective is to continue enhancement of mule deer habitat.

Other: Federal USFWS Partners for Wildlife funding was used to finish the irrigation delivery systems.

TWEED MEADOW

- Description:** Pasture is bisected by Red Canyon Creek, with irrigated meadow west; native upland sites and irrigated meadow (Beanfield) on east side of creek; deep-cut channel with narrow riparian plain along creek. The meadow is primarily improved pasture.
- Acreage:** 200 ac
Elevation: 5800 ft
- Vegetation:** Meadows on west converted from brome/timothy/volunteer alfalfa, to increased creeping meadow foxtail, clovers, wheatgrass, and orchardgrass. Thistle on lower successional sites has been reduced. Meadows were sod-bound, but have begun to recover. Beanfield Meadow converted from "intermediate wheatgrass with dominance of gumweed" to mixture of intermediate/brome/alfalfa; uplands are silver sage/grassland - mostly western wheatgrass, with chokecherry and sumac in draws; one stand of aged cottonwood exists at the mouth of Foster Draw - this area has begun to sprout some new growth; riparian areas are dominated by various species of willow, birch, and numerous woody species. Dense stands of Phragmites are found in some floodplain areas along the creek; the riparian area has shown steady improvement.
- Condition:** Uplands are good; meadows on west side are improved; east side irrigation is effective and major improvement in vegetation occurred in 1996 and 1997 as a result of animal impact during fall and spring feeding; Beanfield is productive stand of hay ground; riparian shrubs have become dense and thick throughout riparian corridor; overall condition is improving rapidly.
- Desired Condition:** Increased forage production in meadows; maintain sprouting and age class distribution of shrubs, increase shade-loving forbs, maintain slopes by maintaining vegetation; sediment trapping and elevation of water table; maintain stream channel characteristics and riparian vegetation.
- Monitoring:** Uplands=photo monitoring, professional judgment. Improved meadow=animal-days-use and tonnage of hay; Riparian=transects (1996); photo monitoring.
- Management:** Grazing use is primarily early spring, fall and winter - use during hot summer months is generally avoided but may be desirable in a long-term rotational plan; meadows are managed for hay production and forage.

Hay Production:	1994	1995	1996	1997	1998	1999	2000	2001	2002
Tweed	0	20	25	51	108	61			
Beanfield	0	0	0	22	58	30			

Fire: No fire is planned in this pasture at the present time.

Invasive Species: There are some isolated outbursts of Canada thistle in the meadows, and spotty occurrences of Russian knapweed. Knapweed is treated with Curtail and by animal impact associated with salting.

Improvements: Irrigation systems in Upper Tweed Meadow have been improved (1997), but continue to be flood irrigated out of ditches - future improvement includes complete system of gated pipe. Buried pipe has been used to eliminate erosive ditches in upper end and between upper and lower Tweed pastures (1996,1998), and gated pipe has been added to a portion of the lower meadow (1998). All meadows have been re-seeded with interseeding technique (1997); Beanfield put into production and gated pipe (1997). Fencing of west side next to Greenough Mountain has been replaced (1996); east side fence has been removed (1995); spring on west side has been repaired, fenced, and piped (1997-1998) and flow has increased by nearly 10X; headgate to Bill's pasture has been rebuilt and delivery ditch is in pipe; tree plantings (Buffaloberry) were done at lower end of Tweed (1998); creek crossing over Red Canyon Creek was altered to facilitate wetland development (1998); fencing to manage use of riparian areas is planned.

Wildlife: Wildlife uses are extensive. This area includes valuable winter habitat for mule deer, summer antelope use, and transitional/winter range for elk and moose. Small mammals are abundant, and songbirds are prevalent. Nesting and foraging for neotropicals is much improved. Waterfowl, including herons and sandhill cranes have begun to use this area. Sage grouse are common, along with other large birds, including blue grouse, chukar, and Hungarian partridge.

DEEP CREEK

Description: Irrigated meadow with extensive beaver-created wetlands and upland hillsides; bisected by county road between uplands on east and wetland areas on the west. Alluvial mouth of Deep Creek Canyon.

Acreage: 60 ac
Elevation: 5800 ft

Vegetation: Wetlands dominated by very healthy stands of mixed willow; mouth of Deep Creek includes cottonwoods of mixed age and structure, including seedling trees; significant mix of woody species, including numerous fleshy fruits - chokecherry, buffaloberry, currant, rose, river birch, dogwood, and various species of willow; irrigated meadow improved from brome/orchard grass to stronger component of legumes and grasses; woody species expanding significantly; thistle and wild licorice near beaver ponds in 1994 has been nearly eliminated; uplands mix of silver sage/western wheat, with significant presence of bitterbrush, sumac, and other shrubs.

Condition: MEETS DESIRED CONDITION

Desired Condition: Enhanced fishery/wildlife value in Deep Creek; forage production in meadow; dense stands of willow and other woody species; nesting and foraging areas for neotropicals and waterfowl; heavy cover for mule deer; forage production in meadows for early season/late fall use by livestock, and hay when appropriate.

Monitoring: Improved pasture=animal-days-use, tonnage of hay, professional judgment; wetlands=photo monitoring established 1995; neotropical migrant songbirds=MAPS site established 1995; Hyperspectral Imagery pilot and continued remote sensing site 1996.

Management: Grazing use 15-25 days, usually in spring; 20-40 days in winter; no grazing during hot summer months; management decisions favor fisheries, songbird habitat, moose, mule deer and elk. Hayfields are generally grazed; if they are hayed, harvest will be delayed until the nesting season is past.

Hay Production:	1994	1995	1996	1997	1998	1999	2000	2001
	2002							
	0	0	0	22	40	0		

Fire: No fire is planned at this time.

Invasive Species: Small occurrences of Russian knapweed are found in the upper SW corner of Deep Creek – these are treated with Curtail and appear to be declining.

Improvements: Irrigation ditches were blown out, and have been converted to buried pipe transmission (1996); interseeding (1997); fences along road removed (1995); all perimeter fencing replaced (1996); headgate to Beanfield replaced (1998), and erosive ditch to Beanfield converted to buried pipe (1997); Crossing on Red Canyon Creek was replaced in 1999, allowing grade control and wetland enhancement; it may be desirable to fence this area in with Bathtub Pasture to better block up land ownership and restrict unwanted use of neighboring lands.

Wildlife: High wildlife values, including more than 85 neotropical species, waterfowl, moose, mule deer, elk, beaver, small mammals. A pale milk snake was observed near the creek in this pasture (1998). Leopard frogs were observed here in 1998 and 1999. The area contains critical range for many species.

Other: This pasture serves as an educational site for Lander Valley High School in an integrated course which includes science, mathematics, and agriculture. That course was implemented Fall 1998.

FOSTER DRAW

Description: Upland pasture with silver sage/grassland/juniper mix; three-tip sage present on southern end of pasture; woody draws angle from SE>NW through state section below Red Canyon rim and below Foster Spring; woody draw with ephemeral water between Game and Fish unit and Red Canyon Creek

Acreage: 400 ac

Elevation: 5700-6500 ft

Vegetation: Highly diverse associations of plants, with juniper, silver sage, threetip, big sagebrush, sumac, willow, Shepherdia, birch, chokecherry; grasses primarily wheatgrasses, with some cheatgrass; larkspur is present, and some large patches of thistle and knapweed are also present adjacent to Game and Fish Unit; Foster Draw includes populations of rare plants (Physaria, Penstemon, Phlox, Townsendia) on SE slopes

Condition: MEETS DESIRED CONDITION

Desired Condition: Increase forage production throughout pasture; uplands=maintain or improve vegetation and ground cover; maintain rare plant communities; riparian=maintain mix of species and shrub cover, improve age class distribution; abundance of deciduous woody plants in draws, on slopes

Monitoring: Uplands - quantitative monitoring of rare plant communities (1995); Photo monitoring rare plants (1995).

Management: Graze 10-30 days in spring; late fall and winter grazing up to 60 days;

Fire: No fire is planned at this time.

Invasive Species: None.

Improvements: Water development at Foster Draw (1994) completed (1997); a spring at the base of Red Canyon rim may be developed; fences removed from road (1995); a series of large, deep ponds is planned for the lower end of Foster Draw - these will collect sediment, provide wildlife water and habitat for waterfowl and other aquatic species, and reduce downcutting of the draw at the lower end

Wildlife:

Mule deer habitat yearlong; elk and antelope transistion range;
chukars, huns, and songbirds

RIPARIAN PASTURE

- Description:** Riparian area along three miles of Red Canyon Creek south of ranch headquarters, established in 1996
- Acreage:** 80 ac
Elevation: 5700-5800 ft
- Vegetation:** Willow present, with brome/sedge understory; increased presence of *Deschampsia*; some *Phragmites* and chokecherry on relict banks of stream channel; extensive beaver activity (1997-1998) has increased deepwater and wetland habitats, as well as diversity of plant species; a number of springs and seeps appeared in 1997-1998.
- Condition:** Riparian shrub cover has been historically stunted; heavy erosion has scoured relict banks, and much of the understory was improved brome grass. Major changes have occurred in the past three years, with a marked increase in willow and other shrubs. Brome is still a major grass in the system, but more spike rush, sedge, and *Deschampsia* are present each year.
- Desired Condition:** Increase shrub cover; improve age class distribution of shrubs, increase shade-loving forbs, stabilize slopes and decrease erosion; trap sediment, elevate water table, and improve water quality in stream
- Monitoring:** Stream transects placed 1995; measure shrub cover, growth form, height, herbaceous dominants, presence/absence of other species, ground cover; three permanent photo points established 1995, retaken 1998.
- Management:** Use in early spring to removed herbaceous plants, and as fall/winter forage reserve; do not use in hot summer. Generally 7-10 days with yearlings or small herd of pairs – can be used more than once annually if conditions are favorable.
- Improvements:** Riparian fence (electric) and water gaps on east side were completed 1996; traditional barbed-wire on west side was completely rebuilt 1996; old dump site was reclaimed 1996; stream structures may improve\accelerate riparian healing;

GREENOUGH MOUNTAIN

Description: Upland slope grading from sagebrush/grassland to nearly solid grassland at SW end of Greenough Mountain

Acreage: 1300 ac
Elevation: 5800-7000 ft

Vegetation: Sagebrush/mixed grass (75%), mountain shrub (25%). Black sage/western wheatgrass/cheatgrass at lower elevations with Artr-vas in draws; Artr-trip grades into Feid/Agsp grasslands near top of mountain; rare plants (Townsendia/Phlox pungens) at SW corner

Condition: MEETS DESIRED CONDITION

Desired Condition: Maintain current mix of species, with reductions in cheatgrass and replacement by perennial grasses; maintain and enhance rare plants; maintain winter forage for elk at higher elevations; eliminate or control small patches of leafy spurge in lower draws

Monitoring: Evaluate potential for rare plant exclosure; quantitative grassland/sage community monitoring (1997); photo points; professional judgment; BLM utilization zone mapping; BLM condition and trend; comparison between LandScan and BLM C&D 1999.

Management: 15-30 days, generally on spring/fall reverse use; pasture should be used as winter pasture at least one year in 3-5 year rotation.

Fire: Fire in lower sagebrush/grassland may be desirable, but not planned at present time. Sage grouse may be a concern.

Invasive Species: Leafy spurge is present in one long upland draw, and has been treated for three years with Weedmaster. There appears to be no spread at this time, but control has not been achieved.

Improvements: Water development completed at spring/pond on Tweed Meadow border 1996; all fences rebuilt 1996; water improvement made at S end by fence relocation and ditch improvement 1996; water gap developed at N end 1996; water tanks placed in center of pasture at lower fence 1999. Additional water might be achieved by use of solar pumping from Red Canyon Creek.

Wildlife:

Sage grouse are present in varying numbers – a lek must exist but has not been identified; high use by mule deer, especially in Fall and Winter; summer pronghorn use; winter elk range; chukars; songbird nesting is abundant.

GREENOUGH MOUNTAIN MONITORING (BLM)

Percent Cover

YEAR	PLOT 1	PLOT 2
1970	14.07	11.48
1971	28.95	16.52
1972	32.06	17.15
1978		65.00 (100 pace)
1984		39.76
1988	81.69	52.08
1997	67.62	66.45
		87.00 (100 pace)

Range 3 X 3 Condition and Trend

YEAR	PLOT 1	PLOT 2
1970	44.07	44.48
1971	55.95	41.52
1972	50.06	34.15
1984		42.50
1988	83.32	53.62
1997	76.02	69.65

BARRETT MEADOW

Description: Irrigated meadow with small riparian area bisecting meadows; some upland sites-big sagebrush/western wheat

Acreage: 100 ac

Elevation: 5600 ft

Vegetation: Riparian area is characterized by willow, hawthorn, some aspen/cottonwood; channel is very narrow; meadows mostly brome/alfalfa, with creeping meadow foxtail in wet areas; some large stands of Basin Wildrye at upper end of meadow; upland sites are very dry, sagebrush mixed-grass;

Condition: Entire pasture was degraded over time; irrigation efficiency has led to this meadow becoming one of the most productive on the ranch; riparian areas are dense, and woody plants are quickly rebounding from an older-age stand to more new growth; beaver activity began in Barrett Creek in 1998;

Desired Condition: Maintain production in meadows; more varied age-class distribution of aspen and other woody species in riparian areas; MEETS DESIRED CONDITION.

Monitoring: Animal days use and tonnage of hay produced; ground cover by professional judgment;

Management: Grazing use not more than 20-30 days in early spring, or as fall holding pasture, rotated winter use with feeding.

Hay Production:	1994	1995	1996	1997	1998	1999	2000	2001
	2002							
	0		120	140	98			

Fire: None planned at this time.

Invasive Species : Two small patches of leafy spurge were found and treated in 1996 until present – there has been a significant decrease in leafy spurge; knapweed was treated in 1995, 1996, and only one small patch remained in 1998 - 1999.

Improvements: Removal of 6 miles of woven wire completed 1994; cross-fenced 1994; deteriorated buildings removed 1994; irrigation systems improved with rock stilling pond at point of diversion, and headgates in main ditches (1996); 6 inch pipe has been used to replace sidehill ditches between upper and lower pastures (1996); interseeding (1997); gated pipe at lower end, and surface pipe at upper end (1998); a pond was rebuilt at the upper end in 1999 to serve as deeper-water habitat for birds; spring pond on south side has been re-inundated for shallow habitat; potential exists for development of a trophy fish pond on this site – discussions with USFWS and WGFD are in progress relative to a site for rearing of cutthroat trout for release into the Little Popo Agie.

Wildlife: Sage grouse use this meadow routinely. Neotropical nesting habitat; beaver established here in 1998; seasonal use by large ungulates; small mammals yearlong.

BARRETT SLOPE/WEISER DRAW

- Description:** Steep slope, with grassland/shrubland; long, narrow riparian corridors on north, south and east, and in Weiser Draw
- Acreage:** 2400 ac
- Elevation:** 5900-7500 ft
- Vegetation:** Sagebrush/mixed grass (40%), mountain shrub (45%), conifer woodland (5%), aspen woodland (5%), riparian/wetland (5%). Highly desirable winter range for deer. Black sage/western wheatgrass grades into Wyoming big sage/Idaho fescue/bluebunch grassland; dense stands of bitterbrush at higher elevations; some patches of aspen, conifers along Cherry Creek canyon and Deep Creek; riparian areas characterized by willow/sedge (Deep Creek), chokecherry/bluegrass (Barrett), willow/conifer/aspen (Cherry Creek), chokecherry (Weiser Draw)
- Condition:** Riparian areas have been historically over-utilized, primarily due to season-long grazing; trailing along Barrett Creek is a problem; uplands are in satisfactory condition, but may be improved by prescribed fire; riparian corridor continues to make slow improvement, which may be accelerated by beaver working up Barrett Creek (1998);
- Desired Condition:** Improve and enhance riparian condition, using woody species as indicators of progress; maintain 2,000 acres in present plant community in uplands; improve cover and litter at NE corner of pasture.
- Monitoring:** BLM condition and trend; BLM utilization zone mapping; photo points established 1995 – retaken 1998, Deep Creek is rated at PFC by BLM;
- Management:** Traditional management has been to rotate spring and fall use on two-year cycle; pasture was used very late in the summer in 1997, with positive results; pasture should be evaluated for winter use within matrix of 3-5 year rotation
- Fire:** Fire would be desirable in some areas of the Barrett Slope, but fuel loads are low, and carrying fire may be difficult. Fire units have not been mapped at this time.

Invasive Species: Leafy spurge is present at the old homestead at the head of Barrett Creek – this has been treated with beetles in 1997. Spread is not rampant, but control has not been achieved.

Improvements: Mouth of Barrett Creek has been fenced, and small rock structures placed in stream (1996); water is limiting in uplands - a potential hydraulic ram pump may alleviate distribution problems and riparian impacts; rebuilding of Cady Spring and extension of Cady pipeline should be planned for 2001; extension of Pat Royce pipeline is planned for 2000; all tanks have been replaced with equipment tire tanks (1997); riparian fencing on Barrett Creek may extend use of uplands.

Wildlife: Extensive use by mule deer, elk, and winter moose; blue grouse, ruffed grouse and sage grouse abundant; coyote; songbirds;

PINE SPRING

- Description:** Upland sagebrush/herbaceous community; stands of lodgepole pine at northern and western edges; dense aspen stands; headwaters for several streams and springs; rare plants (Lefr, Tosp) are found in SW corner of the pasture
- Acreage:** 2600 ac
Elevation: 7200-8100 ft
- Vegetation:** Upland range sites are complex, dominated by various mixes of mountain shrub/perennial grass and sagebrush/mixed grass communities. This makes up approximately 65% - 70% of the pasture. The other 25% - 30% of the vegetative community is made up of conifer woodland and aspen woodland. Approximately 1% - 3% of this pasture has riparian/wetland habitat within the Deep Creek and Upper Barrett Creek drainages; Lesquerella fremontii is found along Tunnel Hill/Limestone Mountain ridge
- Condition:** Riparian areas are much improved, with continued problems at headwaters of Barrett and North Fork of Deep Creek; aspen stands are in rapidly improving condition, with numerous young trees, but conifer encroachment is a problem; uplands are generally satisfactory, but fire is planned. BLM trend in 1997 was UPWARD.
- Desired Condition:** Headwater streams and springs allow for woody growth and recovery of herbaceous plants; expand and enhance health of aspen stands; maintain health and age-class distribution in bitterbrush; maintain or enhance rare plants; maintain some conifer woodland; increase forage production
- Monitoring:** BLM photo points at headwaters of Barrett Creek, Pine Spring, and Deep Creek; BLM 3X3 big sage site; pilot sampling for *Lesquerella fremontii* monitoring; vegetation/ground cover monitoring at BLM enclosure site;
- Management:** Grazing 15-30 days between 15 May and 15 October; traditional use has created constant use in narrow range of hotter season; major shift in use in 1997, as late fall pasture was successful; water development on north end would help with livestock distribution;
- Fire:** Extensive fire is planned in this pasture. Pat Royce Spring area is scheduled for burning in 2000 (approximately 200 acres); Pine Spring burn planned for 2000 (approximately 150 acres); a

combination of logging and burning near Cady Spring would be desirable to release deciduous shrubs and trees.

Invasive Species: None.

Improvements: Fencing of headwaters should be completed; extension of boundary fence on west end may be necessary; pipeline repairs and replacement of old tanks with equipment tires (1997) completed for Pine Spring, Pat Royce, Cady Spring; prescribed fire; riding/herding is essential in this pasture. Extension of Pine Spring pipeline would aid in distribution of livestock; water is not available on north end of pasture, so that area is not used as effectively as it could be.

Wildlife: Pine Spring is used by a wide variety of wildlife, especially large animals, including elk (seasonlong, transition, calving), moose, mule deer, and antelope. Upland birds are common, including sage, ruffed, and blue grouse. Mountain lions have been seen in more abundance in recent years.

Other: This pasture receives very heavy use from wood cutters and hunters; as a result, the road systems throughout are uncontrolled; a recreational focus group has recommended closing a number of the most severely impacted roads

PINE SPRING CONDITION AND TREND
Percent Cover

YEAR	PLOT 1	PLOT 2
1970	26.67	24.50
1971	32.27	32.62
1972	38.36	46.48
1978		77.00 (100 pace)
1984	84.63	44.24
1988	63.70	28.91
1997	62.18	54.32
		91.00 (100 pace)

PINE SPRING

3 X 3 Condition and Trend

YEAR	PLOT 1	PLOT 2
1970	46.67	35.50
1971	54.27	45.62
1972	51.36	54.48
1984	94.73	63.07
1988	65.90	37.38
1997	67.18	62.17

PINE SPRING 3 X 3 ELK/CATTLE EXCLOSURE

	1983	1988	1997
Elk Proof Exclosure	28	24	39
Cattle Proof Exclosure	37	23	39
Control Transect	21	22	37

CHERRY CREEK WETLANDS

- Description:** Sub-alpine beaver influenced riparian/wetland complex, perched above narrow canyon; steep upland slopes on east end, and USFS boundary on west end
- Acreage:** 2000 ac
Elevation: 7300-7800 ft
- Vegetation:** Riparian/wetland habitats comprise 20% or more of this pasture - complex, highly diversified communities dominated by beaked sedge, willow, Nebraska sedge and bluegrass. Transition zones between riparian areas and aspen woodlands dominated by perennial forbs (arrowleaf balsamroot), bluegrass, shrubby cinquefoil, buffaloberry, and Nebraska sedge. These sites are drier than riparian areas and grade into upland sites, and aspen woodland sites. Upland sites comprise 70% - 75% of the pasture. These sites are dominated by perennial forbs (arrowleaf balsamroot), mountain big sagebrush, bitterbrush, Idaho fescue, bluebunch wheatgrass, and have isolated stands of Fremont's bladderpod, a rare plant. Aspen woodlands comprise 5% - 10% of the pasture, and are dominated by mixed-age aspen, perennial forbs, buffalo berry, bluegrass, Letterman needlegrass, and mountain snowberry.
- Condition:** IMPROVING. Riparian communities are beginning to expand, and aspen habitats are releasing new growth. Uplands are stable.
- Desired Condition:** Enhance riparian/wetland community to increase or maintain woody growth; maintain or enhance sedge community; maintain active beaver colonies to maintain water storage and sediment retention; maintain mix of upland species; promote mixed-age distribution of bitterbrush; maintain or enhance rare plants.
- Monitoring:** BLM condition and trend; panoramic photo points throughout pasture established 1995; retaken 1998; stream transect photo points established 1995 – retaken 1998; transects in beaver complex (cover, growth form, height, etc.); BLM photo points
- Management:** Grazing management focused on time and timing of use, generally summer transition pasture or fall use; do not graze in hot summer unless occasional use is beneficial to other pastures; management options would be improved by modification of BLM/Private/Forest jurisdictional lines; use of this pasture in conjunction with Ed Young Basin (1997) has shown positive results for both pastures.

Invasive Species: None.

Improvements: Cow camp established 1996. There is a continued need to fence headwater springs on the margins of the wetland area.

Wildlife: Transition/yearlong range for large ungulates; ring-necked duck nesting; sandhill crane nesting and rearing areas; brook trout fishery; large upland birds are common; neotropical songbirds prevalent, but not quantified. Recent increases in observation of black bears and mountain lions – area may be suited to eventual occupation by grizzly bears.

BLM CONDITION RATING OVER TIME

YEAR	CONDITION RATING
1984	24
1988	31
1997	37

TUB SPRING

- Description:** Mixed browse and herbaceous communities on rocky, dolomite substrate at upper end of pasture; lower end characteristic Chugwater soils, and mixed sage\grassland
- Acreage:** 1200 ac
Elevation: 5800-7600 ft
- Vegetation:** Mountain shrubland (60%), sagebrush/mixed grass (30%), aspen woodland (<1%), conifer woodland (1%-2%), riparian/wetlands (2%-3%). Mountain shrub community important yearlong deer, and fall/winter/spring elk habitat; riparian areas within Cherry Creek Canyon and below Tub Springs; small amount of conifer woodlands within Cherry Creek Canyon and Little Popo Agie Canyon.
- Condition:** This pasture meets desired conditions for wildlife, but seems to be marginal in forage production.
- Desired Condition:** Maintain or enhance aspen; maintain present mountain shrubland community ; maintain current mix of species; increase herbaceous production at lower elevations; maintain age-class distribution of bitterbrush
- Monitoring:** BLM condition and trend; quantitative ground cover - threetip sage (1995); photo point (1995); map aspen (1997);
- Management:** Spring use is most advantageous, but fall use is practical if snowfall doesn't preclude foraging; use in hot summer has been previously avoided, but implemented in 1998, and successful, if water is available. May be used as a winter pasture in years where weather permits; problem with use is concentration of livestock at upper and lower ends, with less use in grasslands on mid-slope.
- Invasive Species:** None.
- Improvements:** Lower end has been broadcast seeded into Basin Wildrye; fences have been repaired and improved; boundary fence between Cherry Creek needs replaced (done 1997); water gap built at lower south end (1997); additional tank from Tub Spring is planned.
- Wildlife:** Season-long mule deer; winter elk; summer antelope; year-long lion and bear; some upland birds.

TUB SPRING CONDITION RATING OVER TIME

YEAR	CONDITION RATING
1984	40
1988	37
1997	50

CHERRY CREEK MEADOW

Description: Irrigated meadows, with extensive riparian areas on Cherry Creek and Red Canyon Creek; upland areas east of county road;

Acreage: 400 ac

Elevation: 5700-5800 ft

Vegetation: Riparian vegetation dominated by willow, with redosier dogwood, some birch, chokecherry, hawthorn; understory primarily brome, clover, sedge and rush; irrigated meadows brome/timothy/alfalfa on Cherry Creek Basin - alfalfa/brome on Cherry Creek bench; upper bench is Wyoming big sage/western wheatgrass; cottonwoods at mouth of Cherry Creek canyon

Condition: Meadows are heavily sodbound and were inter-seeded (1997) with marginal results; division fences removed (1994); riparian areas on lower end severely downcut and lacking vegetation – much of this has been corrected; Cherry Creek riparian rapidly improving – currently meets desired condition; leafy spurge is prevalent in this management unit, but is decreasing;

Desired Condition: Enhance lateral expansion of woody species, elevate water table, increase water quality; increased amounts and diversity of forage production on irrigated meadows; eliminate or control leafy spurge expansion; enhance fishery, neotropical, waterfowl, and mammal habitat

Monitoring: Photo points within stream reaches established 1994; panoramic photo points 1995, retaken 1998; quantitative transects at canyon mouth 1996; animal days use and hay production; professional judgment

Management: Avoid use during hot summer months; harvest hay where conditions and forage permit; graze early/late in alternating years; use as winter pasture with feeding; bench is planned as wildlife enhancement area, including ponds and propagation of woody species.

Hay Production:	1994	1995	1996	1997	1998	1999	2000	2001
2002	0	70	70	71	61	60		

Fire: None planned at this time.

Invasive Species: Leafy spurge is the main problem in this pasture, and while treated vigorously since 1995, it remains a problem. Quackgrass and cheat grass in meadows is also a potential problem.

Improvements: Three miles of dilapidated fence removed 1994; boundary fences completely rebuilt 1996; gated pipe on bench repaired and serviceable 1996; seeding of forager alfalfa on bench 1996; seeding of Cherry Creek Basin 1997; small guest cabin constructed 1996; in-stream structure on Red Canyon Creek 1996; irrigation delivery systems in Basin replaced and converted to gated pipe 1997; major leafy spurge spraying 1995-1998 appears to be effective; three small ponds were built on Cherry Creek Bench (1998); several hundred native trees planted (1998); mouth of Cherry Creek fenced out of upland pastures (1997); stream structures placed in Red Canyon Creek 1999; fencing of RCC planned for 2000.

Other: This meadow serves as a learning site for Lander Valley High School and Lander elementary schools. In 1999, LVHS was awarded a grant from the Wyoming Community Foundation to manage the lower end of Red Canyon Creek. Planning for that is now underway.

RIVER MEADOW

Description: Irrigated/subirrigated meadow with Popo Agie River corridor on southern end

Acreage: 40 ac
Elevation: 5600 ft

Vegetation: Riparian vegetation characterized by mature stands of cottonwood, with some redosier dogwood and willow; meadow primarily Garrison's creeping meadow foxtail, timothy, and brome, with heavy understory of clover

Condition: MEETS DESIRED CONDITION

Desired Condition: Maintain river function, with likely need for channel improvement to repair past activity in the stream; forage production in the meadow should be maintained or increased

Monitoring: Fisheries inventory by WGFD; animal-days use and hay production; panoramic photo points 1995; cottonwood recruitment monitored by annual assessment; macroinvertebrates monitoring by Barb Mack (6th Grade);

Management: Production of hay was a primary objective, with grazing in winter - alternate bulls/heifers/rest; riparian area managed for trophy fishery in long term; in 1998, management objectives moved toward creation and maintenance of wetland habitats, with hay production as a secondary objective in some areas – approximately 25% of this meadow is now managed for wetland values instead of hay.

Hay Production:	1994	1995	1996	1997	1998	1999	2000	2001
	2002							
		0	100	110	90	72	61	

Fire: None.

Invasive Species: Leafy spurge has been found in the meadow in small patches and has been treated; there is some leafy spurge adjacent to Cherry Creek Meadow, also treated.

Improvements: Road fence needs to be replaced; hay corrals rebuilt 1996; instream structures should be evaluated; river fencing will be completed in 2000.

Wildlife:

Deer and moose yearlong; fisheries values are high; waterfowl use is common as nesting and rearing area; cavity nesters are found in old cottonwood sites along oxbows in river; bald eagles use this area for wintering; sandhill cranes nested here in 1998, 1999.

RED CANYON RIM

- Description:** Juniper/sagebrush/grassland
- Acreage:** 500 ac
Elevation: 6000-6200 ft
- Vegetation:** Juniper/big sagebrush/western wheatgrass with pockets of Stipa; dense stands of rare plants, with exception of Lesquerella; major sites for Barneby's clover;
- Condition:** ACCEPTABLE, but appears to be in decline; may be enhanced by grazing, fire, and control of juniper invasion. Major sites for *Trifolium barnabyi* are found on Nugget formation;
- Desired Condition:** Maintain and enhance rare plants; maintain mix of perennial grasses; reestablish fire regime;
- Monitoring:** Permanent plots/microplot to monitor Barneby's clover 1996; pilot studies for other rare plants 1996;
- Management:** Primary management objective is winter/yearlong habitat for mule deer, bobcats, mountain lions, raptors; rare plant study site; grazing use is early spring and winter horse use;
- Fire:** None planned at this time.
- Invasive Species:** None.
- Improvements:** Water source at Guinard homestead needs repair, fencing to keep cattle out of neighbors on north end 1995, 1997, 1998; spring above ranch HQ might be piped to other tanks; fences rebuilt 1998.

LOWER ORCHARD DRAW

- Description:** Mixed black sage/big sage/threetip sage and bitterbrush shrubland with native grasslands comprised of western wheat/bluebunch/*Stipa*
- Acreage:** 600 ac
Elevation: 5700-5900 ft
- Vegetation:** Sagebrush/mixed grass (80%-90%) characterized by western wheatgrass/mixed sagebrush, mountain shrub (10%-20%), abundance of cheat grass; riparian/wetlands primarily chokecherry and bluegrasses (1%).
- Condition:** Below potential; heavy spring and fall use history; cheatgrass stands, heavy Wyoming big sage in the basin, Orchard Creek is ephemeral; in recent years, rest, intensive animal impact, and light use have allowed some regeneration of grasses.
- Desired Condition:** Increased production of perennial grasses; plant communities dominated by black sage/bitterbrush/grass; increased vegetative cover - less bare ground; rehabilitate riparian area in functioning condition;
- Monitoring:** 10 X 10 macroplot to monitor cover, frequency established 1996; animal days use.
- Management:** Critical winter range for mule deer; some use by elk; antelope transition area; high potential for fall burn; cattle use primarily spring or fall, with rotation established 1994; this pasture would make an excellent winter use pasture for cattle, and may allow feeding in some areas;
- Fire:** Fire is planned for the lower basin in 2000.
- Invasive Species:** None.
- Improvements:** Water development in Orchard Draw and at spring in basin would make this pasture effective; small check dams in basin have been repaired, but more emphasis is needed; perimeter fence should be completely replaced; lower end fence was begun in 1997, and may expand pasture, but water is limiting; a pond are being planned in association with USFWS and Wyoming Game and Fish (2000)

ORCHARD DRAW

- Description:** Mixed herbaceous/shrub communities changing with gradient in slope; conifer woodlands at upper end of area; deciduous woodlands small and scattered; bounded by Little Popo Agie canyon on south
- Acreage:** 2400 ac
Elevation: 6200-8000 ft
- Vegetation:** Conifer woodland (10%) along the National Forest boundary on the west side of the pasture; aspen woodland (1%), mountain shrubland (65% - 70%), sagebrush/mixed grass (20%), riparian/wetland (1%) Mountain shrub communities (bitterbrush) on the east end of the pasture are highly important, and grade into sagebrush/mixed grass communities about halfway up the Lander Slope; small riparian areas located below Bucktail spring and Orchard Draw are the only riparian areas within the pasture.
- Condition:** Uplands satisfactory; riparian areas improving with controlled grazing
- Desired Condition:** Maintain present plant community (mountain shrub, sagebrush/mixed grass) on at least 851 acres of deer winter range; enhance riparian condition throughout pasture.
- Monitoring:** BLM condition and trend , photo points near water; animal days use
- Management:** Highly productive pasture for livestock; management is not confined to spring/fall rotation, but those are most effective times to utilize forage; fire has been used, and may be indicated in the future; livestock management primarily riding/herding and placement of salt/minerals; 25-40 days use.
- Fire:** This area was burned in the early 1990s. More fire may be desirable, but none is planned at this time.
- Invasive Species:** None.
- Improvements:** Bucktail Spring fenced 1995; improved water distribution would be helpful.
- Wildlife:** Critical winter range for elk and mule deer; elk calving and yearlong range; summer antelope; sage grouse, blue grouse, chukar, hungarian partridge; neotropicals;

ORCHARD DRAW CONDITION RATING OVER TIME

YEAR	CONDITION RATING
1984	29
1988	30
1997	32

COMMISSARY HILL

Description: Upland pasture with sagebrush/juniper/grassland

Acreage: 1000 ac

Elevation: 6400-6800 ft

Vegetation: Shrublands dominated by big sagebrush/bitterbrush; juniper abundant on east slope; grassland primarily western wheatgrass/Stipa/bluegrass

Condition: MEETS DESIRED CONDITION

Desired Condition: Maintain mix of species and forage production

Monitoring: Professional judgment; animal days use

Management: Pasture is isolated from main ranch; in 1996, agreement was made to exchange use of 150 USFS AUMs (Dick Bieber) for use of this pasture; this exchange resulted in less use of river bottom meadow by Bieber, hay production of approximately 100 tons; and facilitated more effective use of USFS permits by Red Canyon; due to lack of water, summer use is limited to approximately 50 head

Fire: Wildfire burned most of the southeast side in 1999. Rest will be planned for 2000, and early 2001.

Invasive Species: None.

Improvements: Water development on north end was rebuilt 1996; water development on east end needs work.

Wildlife: Transition range for elk, mule deer, antelope; season long mule deer use.

BAYER MOUNTAIN

Description: Grass/Sage mix dominated pasture with scattered areas of Conifers, Junipers, open meadows, large aspen stands, and limited riparian habitats

Acreage: 5500 ac
Elevation: 7800-9000 ft

Vegetation: Aspen stands large and scattered; lodgepole pine, with some Douglas fir; herbaceous primarily Idaho fescue/bluebunch wheatgrass; limited shrubland component

Condition: ACCEPTABLE; age-class diversity of aspen is not totally known;

Desired Condition: Maintain or enhance age and structural diversity in aspen; maintain mix of herbaceous species; maintain or enhance woody draws

Monitoring: Upland photo points established 1995, retaken 1996; 1997; Forest Service - BM1 was installed in 2008 (Photo, Cover, Use)

Management: Historic use was 60 AU for summer/season-long; converted to short-duration grazing in 1996; area is important summer and transition range for elk and mule deer; extremely heavy recreational use most of the year; use=7-15 days, based primarily on impacts to wet meadows and river crossing; effectiveness of time management relies on riding/herding, and would be improved by water development/renovation; use in summer or fall, under deferred-rotation.

Fire: None planned at this time, but conifer encroachment may indicate use of fire in the future. Partially impacted by Purdy wildfire in 2003.

Invasive Species: None.

Improvements: Cattleguard should be placed between Bayer Mountain and Maxon Basin; water development on Freak Mountain should be renovated.

Wildlife: Elk, mule deer summer range; large numbers of antelope have begun to use the pasture in summer; blue grouse, ruffed grouse common. May be suitable range for bighorn sheep.

ED YOUNG BASIN

- Description:** High elevation shrubland/grassland with limited conifer woodland, and numerous headwater springs,
- Acreage:** 2305 ac
Elevation: 7400-8700 ft
- Vegetation:** Uplands dominated by Idaho fescue/bluebunch grasslands, with scattered patches of bitterbrush and some big sagebrush; small aspen groves; riparian areas generally low willow/bluegrass and sedge, with shrub willow.
- Condition:** Uplands very good; headwater streams improving - transition from bluegrass to sedge; woody vegetation increasing.
- Desired Condition:** Maintain mix of herbaceous species in uplands; maintain age-class of bitterbrush; special attention to health and age structure in aspen stands; continue to improve species mix and health of woody vegetation on headwater streams; decrease abundance of conifer in areas traditionally inhabited by aspen.
- Monitoring:** Wyoming GFD has bitterbrush browse and condition transects; photo points established 1995, retaken 1996; 1997; 1998. Forest Service established Parker 3-Step in 1950's, which were recently converted to Cover Frequency and Cover by Life.
- Management:** Historic use was in three pasture rotation with 200 head for approximately 30 days; instituted short-duration grazing in 1996; use ranges from 400-800 head for 6-12 days; pasture is best managed in conjunction with Cherry Creek Wetlands, or Tub Spring;
- Fire:** Much of the basin was burned in 1979 and has recovered very well. Fire is planned for most of the upper areas to reduce conifer, and along the main road. Fire should be used in 2000 or 2001. Area impacted by Pass Creek wildfire that occurred in 2003.
- Invasive Species:** Small areas of Cheatgrass.
- Improvements:** Fencing of headwaters and water in tanks would aid distribution and decrease use of small riparian areas; harvest of Douglas fir and lodgepole is needed on some hill slopes.

Wildlife: Extremely high wildlife values; summer moose, mule deer, antelope; spring elk; transition range for all large species; numerous neotropical species; blue and ruffed grouse;

Other: High recreational use and impacts, primarily from roads and pioneering roads during wet periods; the north end of this pasture has become an access point to Little Popo Agie Canyon, but that has not been a major issue to date. It may be desirable to close the northern end of the road and create a “park-and-walk” access area.

SNOW CREEK

Description: High elevation upland grassland; dense, beaver influenced riparian areas; large aspen stands

Acreage: 3800 AC

Elevation: 7600-8200 ft

Vegetation: Riparian areas primarily willow/sedge, with some aspen; other woody species include buffaloberry, deerbrush, and snowberry; uplands characterized by sagebrush/bitterbrush with understory of fescue and wheatgrasses; aspen is prevalent; dense patches of Douglas fir and lodgepole pine are found in portions of the allotment

Condition: IMPROVING; some problem areas associated with enclosure and boundary fences, cattle loafing area between USFS road and enclosure fence, corner of fence between Snow Creek and Cherry Creek Wetlands; conifer encroachment is evident throughout pasture and may require harvest/fire in future years.

Desired Condition: Enhancement of age and structural diversity of woody plants in riparian areas; evident reproduction and age-class differential in aspen; maintain mix and production of herbaceous species in uplands; maintain browse community

Monitoring: Wyoming GFD condition and production/utilization transects on bitterbrush and herbaceous; riparian transects on North fork of Cherry Creek established 1996; retaken 1997; upland photo point established 1995, retaken 1996; 1997; wetland photo transect established 1996; retaken 1997; INTASS and Biodiversity studies established 1998. Forest Service installed SC1 in 2006 (photos, Cover by life, utilization, and cover frequency)

Management: Traditional three pasture rotation replaced with high-intensity rotation in 1996; riding and herding essential; management challenges include long, narrow enclosure around Snow Creek; pasture can be managed in two units - headwaters of Cherry Creek, and Snow Creek Basin; works well as drift pasture with Ed Young Basin; cultural concerns exist on Ed Young Mountain

Fire: Planned on SE slope of Ed Young Mountain for Spring 2000. More fire is planned in head of Cherrys.

Invasive Species: None

Improvements: Major exclosure (1979) on Snow Creek provides grazed/ungrazed comparison; water development in center rebuilt 1997; fire is scheduled for sagebrush slopes on NE end of pasture;

Wildlife: Summer moose use is high; transition range for other large mammals; black bear common; numerous large upland birds, primarily ruffed grouse; large component of neotropicals; small mammals; waterfowl use the exclosure for nesting and rearing of young.

Other: Major anthropological site located on top of Young Mountain; heavy impacts due to recreational use; roads have been closed, but are often not controlled.

PASS CREEK

- Description:** Uplands dominated by fescue/bluebunch grasslands; heavy stands of conifer have overtaken numerous riparian and upland sites; aspen is found in patches; riparian areas from Pass Creek tributaries and some small wet meadows
- Acreage:** 4000 ac
Elevation: 7600-8900 ft
- Vegetation:** Riparian areas are willow dominated, with potential for sedge understory; aspen areas are largely stable; uplands mix of wheatgrasses/Idaho fescue
- Condition:** Good
- Desired Condition:** Increase cover and density of woody vegetation on Pass Creek and Little Popo Agie River; establish reproductive function and acreage in aspen; maintain or increase biomass and species mix in herbaceous uplands; maintain fisheries habitat in lower Pass Creek; reduce conifer encroachment
- Monitoring:** Wyoming GFD production/utilization and condition on browse and herbaceous communities; beaver-created wetland photo points established 1996; retaken 1997; aspen photo points established 1996; retaken 1997; headwater photo points established 1997; retaken 1998; linear photo overview of lower Pass Creek established 1997; photo point at Little Popo Agie established 1997; Forest Service Parker 3-step location with photo, cover, and use data.
- Management:** Traditional three-pasture rotation with 200 head for 30-40 days replaced with high intensity/short duration grazing in 1996; use 10-20 days in association with other Forest pastures and wetlands; riding and herding is essential to management of this pasture; high recreational use, and summer cabins in center of unit; Pass Creek and Little Popo Agie river are heavily impacted by road, and recreational use;
- Fire:** Fire is planned for much of the west end of this pasture, but will likely require fuel reduction by logging prior to fire being applied. Much of pasture was burned during the Pass Creek wildfire in 2003
- Invasive Species:** Leafy spurge is found next to the main road on the route to Pass Creek. This is likely the result of hay being hauled in for hunting camps. Treated 1998, 1999, 2009.

Improvements: All water is live water - spring development would aid in distribution of cattle.

Wildlife: Considerable wildlife values for all large ungulates; blue and ruffed grouse very common; large component of neotropicals; small mammals; beaver activity has increased significantly since 1996 – numerous dams are now located on lower Pass Creek

Other: Very high recreational use, especially at Little Popo Agie crossing and along lower Pass Creek; cabin sites in private inholding in center of pasture; road plan would help to alleviate some problems associated with recreational uses.

Maxon Basin

Description: Uplands dominated by fescue/bluebunch grasslands and sagebrush; heavy stands of conifer have overtaken numerous riparian and upland sites; aspen is found in patches; large riparian areas and wet meadows along Louis Creek, Hidden Creek and the Little Popo Agie river.

Acreage: 5700 ac
Elevation: 7600-8900 ft

Vegetation: Riparian areas are Sedge and willow dominated; aspen areas are largely stable; uplands mix of wheatgrasses/Idaho fescue/sagebrush

Condition: Good

Desired Condition: Increase cover and density of woody vegetation on Pass Creek and Little Popo Agie River; establish reproductive function and acreage in aspen; maintain or increase biomass and species mix in herbaceous uplands; maintain fisheries habitat in lower Pass Creek; reduce conifer encroachment

Monitoring: Wyoming GFD production/utilization and condition on browse and herbaceous communities; beaver-created wetland photo points established 1996; retaken 1997; aspen photo points established 1996; retaken 1997; headwater photo points established 1997; retaken 1998; linear photo overview of lower Pass Creek established 1997; photo point at Little Popo Agie established 1997; Forest Service established monitoring in 2004 (photos, cover, use)

Management: Traditional three-pasture rotation with 200 head for 30-40 days replaced with high intensity/short duration grazing in 1996; use 10-20 days in association with other Forest pastures and wetlands; riding and herding is essential to management of this pasture; high recreational use, and summer cabins in center of unit; Pass Creek and Little Popo Agie river are heavily impacted by road, and recreational use;

Fire: Fire is planned for much of the west end of this pasture, but will likely require fuel reduction by logging prior to fire being applied. Lower portion along the Little Popo Agie was burned during the Pass Creek wildfire in 2003.

Invasive Species: None.

Improvements: All water is live water.

Wildlife: Considerable wildlife values for all large ungulates; blue and ruffed grouse very common; large component of neotropicals; small mammals; beaver activity has increased significantly since 1996 – numerous dams are now located on lower Pass Creek

Other: Very high recreational use, especially at Little Popo Agie crossing and along lower Pass Creek; cabin sites in private in holding in center of pasture; road plan would help to alleviate some problems associated with recreational uses.



APPENDIX A.

Vascular Plant Flora of Red Canyon Ranch

26 May 1998 edition

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

<i>nauseosus</i>		
<i>Chrysothamnus viscidiflorus var. lanceolatus</i>	Green rabbitbrush	AST
<i>Chrysothamnus viscidiflorus var. viscidiflorus</i>	Green rabbitbrush	AST
<i>Cornus sericea</i>	Red-osier dogwood	COR
<i>Crataegus douglasii var. rivularis</i>	Douglas hawthorn	ROS
<i>Holodiscus dumosus</i>	Ocean spray	ROS
<i>Juniperus communis var. depressa</i>	Common juniper	CUP
<i>Juniperus osteosperma</i>	Utah juniper	CUP
<i>Juniperus scopulorum</i>	Rocky Mountain juniper	CUP
<i>Leptodactylon pungens</i>	Common prickly-phlox	PLM
<i>Lonicera involucrata</i>	Black twinberry	CPR
<i>Mahonia repens</i>	Oregon-grape	BER
<i>Pentaphylloides floribunda</i>	Shrubby cinquefoil	ROS
<i>[Potentilla fruticosa]</i>		
<i>Prunus virginiana var. melanocarpa</i>	Black chokecherry	ROS
<i>Purshia tridentata</i>	Bitterbrush	ROS
<i>Rhus trilobata</i>	Skunkbush	ANA
<i>Ribes aureum</i>	Golden currant	GRS
<i>Ribes cereum var. pedicellare</i>	Wax currant	GRS
<i>Ribes inerme</i>	Whitestem currant	GRS
<i>Ribes oxycanthoides var. setosum</i>	Canada gooseberry	GRS
<i>Ribes viscosissimum</i>	Sticky currant	GRS
<i>Rosa sayi</i>	Prickly rose	ROS
<i>Rosa woodsii</i>	Woods' rose	ROS
<i>Rubus idaeus</i>	Red raspberry	ROS
<i>Salix bebbiana</i>	Bebb willow	SAL
<i>Salix exigua</i>	Coyote willow	SAL
<i>Salix geyeriana</i>	Geyer willow	SAL
<i>Salix lutea</i>	Yellow willow	SAL
<i>[S. eriocephala var. watsonii]</i>		
<i>Shepherdia argentea</i>	Silver buffaloberry	ELE
<i>Shepherdia canadensis</i>	Canada buffaloberry	ELE
<i>Symphoricarpos oreophilus var. utahensis</i>	Mountain snowberry	CPR
<i>Tetradymia canescens</i>	Gray horsebrush	AST
<i>Toxicodendron rydbergii</i>	Poison ivy	ANA

FORBS

<i>Achillea millefolium var. lanulosa</i>	Western yarrow	AST
<i>Actaea rubra</i>	Red baneberry	RAN
<i>Agoseris aurantiaca</i>	Orange false-dandelion	AST
<i>Agoseris glauca var. dasycephala</i>	Thickhead false-dandelion	AST
<i>Agoseris glauca var. laciniata</i>	Cutleaf false-dandelion	AST
<i>Allium brandegei</i>	Brandegee onion	LIL

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

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

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

<i>Lappula redowskii</i> var. <i>redowskii</i>	Western stickseed	BOR
<i>Lathyrus eucosmus</i>	Seemly sweetpea	FAB
<i>Lesquerella alpina</i> var. <i>alpina</i>	Alpine bladderpod	BRA
<i>Lesquerella fremontii</i>	Fremont bladderpod	BRA
<i>Lewisia pygmaea</i>	Pygmy bitterroot	POR
<i>Lewisia rediviva</i>	Bitterroot	POR
<i>Linum lewisii</i>	Blue flax	LIN
<i>Lithophragma glabrum</i> var. <i>ramulosum</i>	Bulblet woodland-star	SAX
<i>Lithospermum incisum</i>	Yellow gromwell	BOR
<i>Lithospermum ruderale</i>	Western gromwell	BOR
<i>Lomatium cous</i>	Cous biscuitroot	API
<i>Lomatium dissectum</i> var. <i>multifidum</i>	Fern-leaved biscuitroot	API
<i>Lomatium macrocarpum</i>	Big-seed biscuitroot	API
<i>Lomatium orientale</i>	Eastern biscuitroot	API
<i>Lomatium triternatum</i> var. <i>platycarpum</i>	Nineleaf biscuitroot	API
<i>Lupinus argenteus</i>	Silvery lupine	FAB
<i>Lupinus lepidus</i> var. <i>utahensis</i>	Prairie lupine	FAB
<i>Lupinus polyphyllus</i> var. <i>humicola</i>	Wyeth's lupine	FAB
<i>Maianthemum stellatum</i>	Starry false Solomon's-seal	LIL
<i>Machaeranthera canescens</i>	Hoary aster	AST
! <i>Medicago lupulina</i>	Black medic	FAB
! <i>Medicago sativa</i>	Alfalfa	FAB
! <i>Melilotus officinalis</i>	Yellow sweetclover	FAB
<i>Mentha arvensis</i> var. <i>canadensis</i>	Field mint	LAM
<i>Mertensia ciliata</i>	Ciliate bluebells	BOR
<i>Mertensia oblongifolia</i>	Oblong bluebells	BOR
<i>Mertensia viridis</i>	Greenleaf bluebells	BOR
<i>Microseris nutans</i>	Nodding microseris	AST
<i>Microsteris gracilis</i> var. <i>humilior</i>	Pink microsteris	PLM
<i>Mimulus guttatus</i>	Yellow monkeyflower	SCR
<i>Nemophila breviflora</i>	Great Basin nemophila	HYD
<i>Nothocalais nigrescens</i>	Black-hairy microseris	AST
<i>Oenothera cespitosa</i>	Tufted evening-primrose	ONA
<i>Opuntia polyacantha</i> var. <i>polyacantha</i>	Plains prickly-pear	CAC
<i>Orobanche uniflora</i>	One-flowered broomrape	ORO
<i>Orthilia secunda</i>	Sidebells pyrola	ERI
<i>Orthocarpus luteus</i>	Yellow owl-clover	SCR
<i>Osmorhiza chilensis</i>	Mountain sweet-cicely	API
<i>Osmorhiza depauperata</i>	Blunt-fruit sweet-cicely	API
<i>Oxytropis sericea</i>	Silky locoweed	FAB
<i>Penstemon attenuatus</i> var. <i>pseudoprocerus</i>	Taper-leaved beardtongue	SCR
<i>Penstemon eriantherus</i>	Fuzzytongue beardtongue	SCR
<i>Penstemon glaber</i> var. <i>glaber</i>	Glabrous beardtongue	SCR
<i>Penstemon humilis</i>	Low beardtongue	SCR
<i>Penstemon laricifolius</i>	Larch-leaved beardtongue	SCR

<i>Penstemon paysoniorum</i>	Payson's beardtongue	SCR
<i>Penstemon procerus</i>	Littleflower beardtongue	SCR
<i>Penstemon radicosus</i>	Matroot beardtongue	SCR
<i>Penstemon strictus</i>	Straight beardtongue	SCR
<i>Perideridia montana</i>	Mountain yampah	API
<i>Phacelia hastata</i>	Silverleaf phacelia	HYD
<i>Phacelia sericea</i>	Silky phacelia	HYD
<i>Phlox hoodii</i>	Hoods phlox	PLM
<i>Phlox longifolia</i>	Long-leaf phlox	PLM
<i>Phlox multiflora</i>	Many-flowered phlox	PLM
<i>Phlox pungens</i>	Beaver Rim phlox	PLM
<i>Physaria saximontana</i> var. <i>saximontana</i>	Rocky Mountain twinpod	BRA
<i>Plantago patagonica</i>	Indian-wheat	PTG
<i>Polygonum amphibium</i>	Water swartweed	PLG
<i>Polygonum bistortoides</i>	Alpine bistort	PLG
<i>Polygonum douglasii</i>	Douglas' knotweed	PLG
<i>Polygonum minimum</i>	Dwarf knotweed	PLG
<i>Polygonum sawatchense</i>	Sawatch knotweed	PLG
<i>Potentilla arguta</i>	Glandular cinquefoil	ROS
<i>Potentilla concinna</i> var. <i>concinna</i>	Early cinquefoil	ROS
<i>Potentilla gracilis</i> var. <i>elmeri</i>	Elmer's cinquefoil	ROS
<i>Potentilla gracilis</i> var. <i>nuttallii</i>	Slender cinquefoil	ROS
<i>Potentilla hippiana</i>	Woolly cinquefoil	ROS
! <i>Potentilla norvegica</i>	Norwegian cinquefoil	ROS
<i>Potentilla ovina</i> var. <i>ovina</i>	Sheep cinquefoil	ROS
<i>Pterospora andromeda</i>	Pinedrops	ERI
<i>Ranunculus glaberimmus</i> var. <i>ellipticus</i>	Sagebrush buttercup	RAN
<i>Ranunculus macounii</i>	Macoun's buttercup	RAN
! <i>Ranunculus testiculatus</i>	Male buttercup	RAN
<i>Rorippa calycina</i>	Persistent sepal yellowcress	BRA
! <i>Rumex crispus</i>	Curly dock	PLG
<i>Rumex paucifolius</i>	Mountain sorrel	PLG
<i>Saxifraga rhomboidea</i>	Diamondleaf saxifrage	SAX
<i>Sedum lanceolatum</i>	Lance-leaved stonecrop	CRS
<i>Senecio canus</i>	Woolly groundsel	AST
<i>Senecio integerrimus</i> var. <i>exaltatus</i>	Western groundsel	AST
<i>Senecio pauperculus</i>	Balsam groundsel	AST
<i>Senecio sphaerocephalus</i>	Mountain-marsh groundsel	AST
<i>Senecio streptanthifolius</i>	Cleft-leaved groundsel	AST
<i>Silene drummondii</i>	Drummond campion	CRY
<i>Silene menziesii</i>	Menzies' catchfly	CRY
! <i>Sisymbrium altissimum</i>	Tumblemustard	BRA
<i>Solidago canadensis</i>	Canada goldenrod	AST
<i>Solidago multiradiata</i> var. <i>scopulorum</i>	Northern goldenrod	AST
<i>Solidago nana</i>	Low goldenrod	AST
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	MLV

<i>Swertia radiata</i>	Green gentian	GEN
[<i>Frasera speciosa</i>]		
! <i>Taraxacum laevigatum</i>	Smooth dandelion	AST
! <i>Taraxacum officinale</i>	Common dandelion	AST
<i>Thalictrum fendleri</i>	Fendler meadow-rue	RAN
<i>Thermopsis rhombifolia</i>	Round-leaved goldenpea	FAB
! <i>Thlaspi arvense</i>	Field pennycress	BRA
<i>Thlaspi parviflorum</i>	Small flowered pennycress	BRA
<i>Townsendia hookeri</i>	Hooker's Easter-daisy	AST
<i>Townsendia parryi</i>	Parry's Easter-daisy	AST
<i>Townsendia spathulata</i>	Swordleaf Easter-daisy	AST
! <i>Tragopogon dubius</i>	Yellow salsify	AST
<i>Trifolium andinum</i>	Andean clover	FAB
<i>Trifolium barnebyi</i>	Barneby's clover	FAB
<i>Trifolium gymnocarpon</i>	Hollyleaf clover	FAB
! <i>Trifolium hybridum</i>	Alsike clover	FAB
! <i>Trifolium repens</i>	White clover	FAB
<i>Urtica dioica</i> var. <i>procera</i>	Stinging nettle	URT
<i>Veronica americana</i>	American speedwell	SCR
<i>Vicia americana</i>	American vetch	FAB
<i>Viola adunca</i>	Early blue violet	VIO
<i>Viola nephrophylla</i>	Northern bog violet	VIO
<i>Viola nuttallii</i>	Yellow prairie violet	VIO
<i>Viola praemorsa</i> var. <i>altior</i>	Upland yellow violet	VIO
<i>Viola purpurea</i> var. <i>venosa</i>	Goosefoot violet	VIO
<i>Viola vallicola</i>	Valley yellow violet	VIO
<i>Zigadenus elegans</i>	Mountain death-camas	LIL
<i>Zigadenus venenosus</i> var. <i>gramineus</i>	Meadow death-camas	LIL

GRAMINOIDS

! <i>Agropyron cristatum</i>	Crested wheatgrass	POA
! <i>Agrostis stolonifera</i>	Redtop	POA
! <i>Alopecurus pratensis</i>	Meadow foxtail	POA
! <i>Arrhenatherum elatius</i>	False oatgrass	POA
<i>Bromus carinatus</i>	California brome	POA
! <i>Bromus commutatus</i>	Hairy brome	POA
! <i>Bromus inermis</i> var. <i>inermis</i>	Smooth brome	POA
! <i>Bromus tectorum</i>	Cheatgrass	POA
<i>Calamagrostis montanensis</i>	Plains reedgrass	POA
<i>Carex aquatilis</i>	Water sedge	CYP
<i>Carex aurea</i>	Golden sedge	CYP
<i>Carex douglasii</i>	Douglas sedge	CYP
<i>Carex filifolia</i>	Thread-leaved sedge	CYP
<i>Carex hoodii</i>	Hoods sedge	CYP
<i>Carex lanuginosa</i>	Woolly sedge	CYP

<i>Carex microptera</i>	Smallwing sedge	CYP
<i>Carex nebrascensis</i>	Nebraska sedge	CYP
<i>Carex petasata</i>	Liddon's sedge	CYP
<i>Carex praegracilis</i>	Clustered field sedge	CYP
<i>Carex praticola</i>	Meadow sedge	CYP
<i>Carex rossii</i>	Ross' sedge	CYP
<i>Carex rostrata</i>	Beaked sedge	CYP
[<i>Carex utriculata</i>]		
<i>Carex stenophylla</i>	Narrow-leaved sedge	CYP
<i>Carex vallicola</i>	Valley sedge	CYP
<i>Danthonia unispicata</i>	Onespike oatgrass	POA
<i>Deschampsia cespitosa</i>	Tufted hairgrass	POA
<i>Elymus albicans</i> var. <i>griffithsii</i>	Griffiths' wheatgrass	POA
<i>Elymus cinereus</i>	Basin wildrye	POA
[<i>Leymus cinereus</i>]		
<i>Elymus elymoides</i>	Bottlebrush squirreltail	POA
[<i>Sitanion hystrix</i>]		
<i>Elymus glaucus</i>	Blue wildrye	POA
<i>Elymus smithii</i>	Western wheatgrass	POA
[<i>Pascopyrum smithii</i>]		
<i>Elymus spicatus</i>	Bluebunch wheatgrass	POA
[<i>Pseudoroegneria spicata</i>]		
<i>Elymus trachycaulus</i> var. <i>andinus</i>	Awned slender wheatgrass	POA
<i>Elymus trachycaulus</i> var. <i>trachycaulus</i>	Slender wheatgrass	POA
<i>Festuca idahoensis</i>	Idaho fescue	POA
<i>Festuca saximontana</i>	Sheep fescue	POA
[<i>Festuca ovina</i> var. <i>rydbergii</i>]		
<i>Hordeum brachyantherum</i>	Meadow barley	POA
<i>Hordeum jubatum</i>	Foxtail barley	POA
<i>Juncus balticus</i> var. <i>montanus</i>	Baltic rush	JUN
<i>Juncus longistylis</i>	Long-styled rush	JUN
<i>Koeleria macrantha</i>	Prairie junegrass	POA
<i>Leucopoa kingii</i>	King spikefescue	POA
<i>Melica bulbosa</i>	Oniongrass	POA
<i>Melica spectabilis</i>	Showy oniongrass	POA
<i>Muhlenbergia cuspidata</i>	Plains muhly	POA
<i>Oryzopsis hymenoides</i>	Indian ricegrass	POA
<i>Phragmites australis</i>	Common reed	POA
<i>Poa cusickii</i> var. <i>cusickii</i>	Cusick's bluegrass	POA
<i>Poa cusickii</i> var. <i>epilis</i>	Skyline bluegrass	POA
<i>Poa fendleriana</i>	Muttongrass	POA
<i>Poa nervosa</i> var. <i>wheeleri</i>	Wheeler bluegrass	POA
<i>Poa palustris</i>	Fowl bluegrass	POA
! <i>Poa pratensis</i>	Kentucky bluegrass	POA
<i>Poa secunda</i>	Sandberg bluegrass	POA
<i>Stipa comata</i> var. <i>intermedia</i>	Needle-and-thread	POA

<i>Stipa lettermanii</i>	Letterman's needlegrass	POA
<i>Stipe nelsonii</i>	Nelson's needlegrass	POA
<i>Stipa occidentalis</i>	Western needlegrass	POA
<i>Stipa pinetorum</i>	Pine needlegrass	POA
<i>Trisetum spicatum</i>	Spike trisetum	POA
<i>Trisetum wolfii</i>	Wolf trisetum	POA

FERNS AND FERN ALLIES

<i>Cystopteris fragilis</i>	Bladder fern	ASL
<i>Equisetum arvense</i>	Field horsetail	EQU
<i>Equisetum laevigatum</i>	Smooth horsetail	EQU
<i>Selaginella densa</i>	Dense spike-moss	SEL

APPENDIX B

The Nature Conservancy's
Red Canyon Ranch

Prepared for the

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12 June 1995

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, Trifolium barnebyi (Barneby's clover) and Lesquerella 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 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.

Similar Species: Alpine bladderpod (L. alpina) is the only other Lesquerella 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.

Flowering/Fruiting Period: Flowering occurs from late May through late June, depending on seasonal moisture conditions. Fruits mature from early June to mid July.

Habitat: Fremont bladderpod typically occurs in sparsely vegetated montane meadows or shallow depressions on slopes and ridges with scattered limber pine (Pinus flexilis). 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 (Artemisia tripartita). Occasionally, Fremont bladderpod can be found in narrow, soil-filled cracks in calcareous boulders or exposed bedrock. L. fremontii 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.

Global Distribution: The entire global range of L. fremontii 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.

Comments: Over 20 species in the genus Lesquerella 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 (L. fendleri), 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. Lesquerella 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. L. fremontii 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.

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 pollen-producing 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 Penstemon are known from Red Canyon. Each of these differs from P. paysoniorum 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 Phlox pungens and Physaria saximontana in cushion plant communities at the interface of Chugwater Redbeds and Nugget Sandstone.

Global Distribution: The entire global range of P. paysoniorum 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, P. paysoniorum is no longer being considered as a candidate for federal protection.

Comments: 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

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 lance-shaped, 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.

Flowering/Fruiting Period: 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).

Global Distribution: The entire global range of P. pungens 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. P. pungens 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.

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 Physaria species are currently known from Red Canyon. Members of the genus Lesquerella superficially resemble Physaria in flower, but can be distinguished by their undivided fruits.

Flowering/Fruiting Period: 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 Phlox pungens and other cushion plants on steep slopes, ledges, and cliffs, usually with little to no shrub cover.

Global Distribution: Variety saximontana 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. dentata) is found only in Montana.

Red Canyon Distribution: P. saximontana 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.

Comments: The Red Canyon Ranch occurrence is one of only two in Wyoming that currently receive formal protection.

References: Dorn 1992; Fertig 1992; Fertig et al. 1994; Jones 1989; Rollins 1984, 1993.

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.

Similar Species: No other species of Rorippa are currently known from Red Canyon. The most similar species in Wyoming is R. sinuata, a rhizomatous perennial with elongate, glabrous fruits over 3/16 inches (5 mm) long. All other Wyoming Rorippa species are taprooted annuals.

Flowering/Fruiting Period: 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.

Global Distribution: 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: R. 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.

Comments: There is relatively little potential habitat for R. calycina 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.

References: Fertig et al. 1994; Lichvar 1981; Rollins 1993; Stuckey 1972.

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

Natural Heritage Rank: G3/S3.

Description: Swordleaf Easter-daisy is a taprooted, often multi-branched, perennial herb with a dense rosette of basal leaves. Individual leaves are woolly-hairy, narrowly spoon-shaped, 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.

Similar Species: Two other species of Townsendia are currently known from Red Canyon Ranch. Hooker's Easter-daisy (Townsendia hookeri) has narrow, linear leaves, pointed-tipped involucre bracts arranged in 5 or more rows, and persistent pappus bristles at maturity. Parry's Easter-daisy (T. parryi) differs in having tall, erect stems and larger flower heads.

Flowering/Fruiting Period: 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 (Artemisia tridentata), threetip sagebrush (A. tripartita), and Utah juniper (Juniperus osteosperma) communities.

Global Distribution: 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: T. spathulata 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.

Comments: The morphologically similar species, T. nuttallii (Nuttall's Easter-daisy), was once thought to occur at Red Canyon Ranch. Specimens attributed to this species have since proven to be T. hookeri. 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.

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

Natural Heritage Rank: G1/S1.

Description: 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 (T. gymnocarpon) has pubescent, leathery leaflets with 5-10 widely spaced veins and is not mat-forming. Andean clover (T. andinum) differs in having a "false involucre" of broad leaf stipules beneath the flower heads.

Flowering/Fruiting Period: 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.

Global Distribution: The entire known global range of T. barnebyi 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.

Red Canyon Distribution: 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.

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

References: Dorn and Lichvar 1981; Isely 1980; Fertig et al. 1994; Marriott 1986.

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APPENDIX C

RED CANYON RANCH AVIAN SPECIES LIST 1995 - 1998

(From Jim and Gloria Lawrence and the Deep Creek MAPS Station)

Great Blue Heron
Green-winged Teal
Mallard
Sharp-shinned Hawk *
Red-tailed Hawk *
Golden Eagle *
American Kestrel *
Blue Grouse
Ruffed Grouse
Sora
Sandhill Crane
Killdeer *
Spotted Sandpiper
Common Snipe
Mourning Dove *
Common Nighthawk *
Common Poorwill *
White-throated Swift *
Belted Kingfisher *
Broad-tailed Hummingbird *
Rufous Hummingbird *
Lewis' Woodpecker *
Red-naped Sapsucker *
Downy Woodpecker
Hairy Woodpecker
Northern Flicker (Red- shafted)
Western Wood-Pewee *
Willow Flycatcher *
Least Flycatcher *
Dusky Flycatcher *
Gray Flycatcher *
Cordilleran Flycatcher *
Say's Phoebe *
Eastern Kingbird *
Horned Lark *

Tree Swallow *
Violet-green Swallow *
Northern Rough-winged Swallow *
Cliff Swallow *
Barn Swallow *
Pinyon Jay
Clark's Nutcracker
Black-billed Magpie
American Crow
Common Raven
Black-capped Chickadee
Mountain Chickadee
White-breasted Nuthatch
Rock Wren *
House Wren *
American Dipper
Ruby-crowned Kinglet *
Mountain Bluebird *
Townsend's Solitaire *
Veery *
Swainson's Thrush *
Hermit Thrush *
American Robin *
Gray Catbird *
Brown Thrasher
Cedar Waxwing *
European Starling
Warbling Vireo *
Red-eyed Vireo *
Tennessee Warbler *
Orange-crowned Warbler *
Virginia's Warbler *
Yellow Warbler *
Chestnut-sided Warbler *
Magnolia Warbler *
Yellow-rumped Warbler *
American Redstart *
Northern Waterthrush *
MacGillivray's Warbler *

Common Yellowthroat *
Wilson's Warbler *
Yellow-breasted Chat *
Western Tanager *
Black-headed Grosbeak *
Blue Grosbeak *
Lazuli Bunting *
Green-tailed Towhee *
Spotted Towhee *
Chipping Sparrow *
Brewer's Sparrow *
Vesper Sparrow *
Lark Sparrow *
Savannah Sparrow *
Fox Sparrow *
Song Sparrow *
Lincoln's Sparrow *
White-crowned Sparrow *
Dark-eyed Junco *
Red-winged Blackbird *
Western Meadowlark *
Brewer's Blackbird *
Common Grackle
Brown-headed Cowbird *
Bullock's Oriole *
Pine Siskin *
American Goldfinch *
House Sparrow

Total Avian Species = 102

* = Classified as a Neotropical Migratory Bird (77 species)