Shell Oil Company and the Mule Deer Foundation Sponsor a Unique Conservation Initiative

On a Working Wyoming Landscape
The Farson Landowners’
The Farson Landowners’ “Healthy Lands Initiative”
A Unique Conservation Initiative on a Working Wyoming Landscape
Sponsored by Shell Oil Company and the Mule Deer Foundation

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Acknowledgements

This project would not have been initiated without the foresight and leadership of Shell Oil Company who proposed the project to Wyoming Governor Dave Freudenthal. It was Governor Dave Freudenthal’s decision to place Shell Oil Co.’s Healthy Lands Initiative (HLI) financial commitment of $500,000.00 towards this project into the Wyoming Wildlife and Natural Resource Trust (WWNRT). The WWNRT provided partial matching funds for the project. The Mule Deer Foundation (MDF), was the key partner in oversight, administration, and sponsorship of the project. In addition, MDF provided biological advice and technical assistance.

We appreciate the work and support of the rancher/landowners in the project area Gary and Jo Ann Zakotnik who served as lead project ranchers/landowners and John Andrikopoulos (rancher/advisor). The Bureau of Land Management (BLM), and the “Gasson” allotment permittees contribution to the project was critical. The owners of the private portion of the checkerboard lands were invaluable partners in the project and included: John Hay III (President, Rock Springs Grazing Association - RSGA), Don Schramm, and the board of directors of RSGA. We also thank landowners/grazing permittees: Steve Tomich (landowner), Ed and Lee Burton (landowners), Steve Mines (grazing permittee), and Kathy Keyes (landowner) for participating in the project.

The staff of the Rock Springs District of the BLM including, the Area Manager, the Area Range Conservationist, the Cultural Resource Specialist, and the Construction Crew were all especially helpful and supportive in many ways throughout the project, including: 1) completion of an Environmental Assessment (EA) for facets of the project on BLM lands; 2) providing direction and approvals for the repair and replacement of the White Mountain water pipeline; 3) for providing the labor in the repair and replacement of the pipeline; 4) for providing direction and approvals for meeting the cultural resource requirements under the National Historic Preservation Act (NHPA); and, 5) for periodic review of the project as we planned and implemented all four project phases.

Bob Budd, Director of WWNRT, reviewed and recommended qualified projects to be submitted for cost-share funding by the WWNRT. Bob Budd and the area Trust Fund Board members made several trips to the proposed project sites.
Kevin Spence, Habitat Biologist, Wyoming Game and Fish Dept. (WGFD) provided his time to meet and make suggestions on elimination of whitetop, a noxious weed, and subsequent re-vegetation to native plants in the project area. Also, thanks go to Dan Madsen and Aaron Draycott of the Sweetwater County Weed and Pest District of Farson (SCWPD), Wyoming who worked closely with the BLM and Dave Lockman in the planning, eradication, and control of giant whitetop, as well as assisted in some planting efforts on the habitat restoration project site.

We also appreciated the help of Bob and Garrett Wharff, Glenn Reddon, and other members of the Wyoming Sportsmen for Fish and Wildlife (WSFW), as well as local MDF members, who volunteered and assisted in the planting of shrub seedlings. Justin Caudill, Field Specialist for the Wyoming Department of Agriculture assisted us in the field on numerous occasions. Jim Schwartz (retired Wyoming Dept. of Agriculture Deputy Director and retired Director of the Wyoming Livestock Board), Gary Butler (retired WGFD Terrestrial Habitat Supervisor), and Daryle Bennett (Granite Seed Co.) provided an initial technical review of the draft document and valuable suggestions, all of which have been incorporated herein.

Dave Lockman (WMSR) provided all of the photographs, and all were taken in the project area except the cover photo which was taken in the LaBarge Oil Field in 1988. The LaBarge/Big Piney Oil and Gas Field has been in existence since the 1930’s and within the field is one of the largest mule deer winter range complexes in the Wyoming Range Mule Deer Herd Unit.

A special thank you goes to Jo Ann Zakotnik who provided encouragement and meals to project site visitors and to a hungry and tired crew on many occasions throughout the project. She also kept her husband Gary on task, which was not an easy job.
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INTRODUCTION

This was, is not, and was never intended to be a research project. It was instead, a classic wildlife habitat management project. The specific projects prescribed, implemented, and project sites selected within the 196,000 acre landscape area were based on two years of baseline data collection on and familiarity with the wildlife, agriculture, and habitat relationships within the area. This project is unique in the sense that it was voluntarily initiated and funded by an oil and gas company (Shell Oil Company), sponsored by a leading national conservation group (MDF), endorsed by the Wyoming Governor and the Wyoming Wildlife Natural Resources Trust (WWNRT), and led by private landowners and a grazing association Rock Springs Grazing Association (RSGA). This report is a documentation of what was accomplished between 2008 and 2016 on the project lands located in Southwestern Wyoming on mixed private, BLM, Bureau of Reclamation (BOR) lands managed by the BLM, and land of the State of Wyoming Lands and Investment Board (SLIB). The area is located south of Eden and Farson, and north of Rock Springs, Wyoming. The landscape area contains 196,000 acres, of which 29% is private, 70% is BLM and BOR lands, and less than 1% is SLIB lands (MAP 1).

The area is within a 6–9” precipitation zone, and regarded as a high, cold desert sagebrush-dominated plant and animal community. The Eden-Farson agricultural area lies on the north end of the project area, and was created as an irrigation district by the (BOR) and sold to private landowners in the early years of the twentieth century. Within the project area farming, ranching, livestock production, oil and gas exploration and development, and hunting are the primary multiple-use activities on this working landscape.

Origin of the Initiative

The HLI was initiated in 2008 by former U.S. Secretary of the Interior Dirk Kempthorne and involved BLM lands in seven western states. The initiative promoted the concept and method for meeting emerging challenges in managing natural resources with flexible approaches for continued multiple use on a working landscape.

Shell Oil Co. representatives were interested in applying a Healthy Lands Initiative in the upper Green River drainage of western Wyoming in an area outside their area of oil and gas development in the Pinedale Anticline, and not associated with their mitigation program.

Shell Oil Co. in a meeting with Secretary Kempthorne agreed to fund $500,000 for an HLI, called the “Farson Landowners Landscape Initiative”, in the upper Green River drainage of western Wyoming in an area outside and distinct from their area of oil and gas development in the Pinedale Anticline. This project was not associated with Shell Oil Co.’s mitigation program for the Pinedale Anticline Oil and Gas Supplemental Environmental Impact Statement and Record of Decision. Shell Oil Co. subsequently requested and reviewed several options for participation in an HLI in the Green River basin of Wyoming. After reviewing those options Shell Oil Co. opted to initiate an HLI project of 196,000 acres with a mixed land status (BLM, BOR, State, and private lands) south of Farson, Wyoming. This land area had the necessary diverse wildlife habitat and multiple land use components over a large contiguous area to implement the improvements and management activities required for an HLI project. The project area was representative of lands in the upper Green River Basin which are subject to many multiple uses. Shell Oil Co., where applicable, could use the techniques, planting prescriptions, and water development prescriptions used in this project on other projects in which they are involved.

The area, selected by Shell Oil Co., had been subject to previous intensive wildlife, agriculture, and habitat baseline inventory and survey in 2006 – 2008 in a project called the
“Wyoming Ranch Agriculture and Wildlife Management Planning Project” which was funded by EnCana USA, the Tom Thorne Conservation Fund created by Shell Oil Co., and the Wyoming Wildlife Heritage Foundation. This precursor project was designed by the Wyoming Department of Agriculture working with Dave Lockman and John Andrikopolous (rancher, Big Piney, Wyoming). Dave Lockman, owner and principal biologist, of Wildlife Management Services of the Rockies, LLC (WMSR) with the assistance of Dusty and Janet Lockman, conducted and supervised this work under the guidance and assistance of area private landowners and with support by local, state, and federal wildlife, agriculture, and land management agency personnel. Having these baseline data enabled the project to lessen cost and advance from baseline inventory to project improvement and development on a landscape level as quickly as possible.

Prior to Shell Oil Co. selecting this area as the proposed HLI project, major landowners in the area were met with, consulted, and supportive of the project. The landowners agreed to lead, design, and participate in the project. Field activities and administrative office work on behalf of the landowners was assisted by Art Reese, then a consultant for Shell Oil Co., and Dave Lockman, principal field wildlife and habitat management specialist.

Shortly after agreeing to participate in the HLI program and selecting the project area Shell Oil Co. representatives met with Governor Dave Freudenthal. The HLI being proposed by Shell Oil Co. was discussed and it was agreed to employ a Healthy Lands Initiative Project in this area called the “Farson Landowners’ Landscape Initiative”. This Shell Oil Co. project was under the guidance and management of Fred Palmer of Shell Oil Co., who partnered with the MDF, and the WWNRT.

Lead private landowners and grazing leasees for the project were Gary and Jo Ann Zakotnik, (GZ Livestock Co.), the RSGA (represented by John Hay III and Don Schramm), Kathy Keyes (landowner), Ed and Lee Burton (landowners), Steve Mines (rancher), and Steve Tomich (landowner).

**Improvement Projects Benefitting Wildlife and Livestock**

The project area has a diversity of habitat with opportunities for enhancements benefitting wildlife, agricultural activities, and rangeland health. The project consisted of four phases that were designed and completed on 34 project sites (MAP 2). The projects included various types of improvements benefitting livestock, wildlife, rangeland plant diversity, and watershed health. These included:

1) improvement and renovation of existing upland water sources;
2) new livestock and wildlife drinking water developments in arid uplands;
3) riparian and associated upland fencing around existing artesian water sources;
4) modification of existing fencing to “wildlife friendly fencing”;
5) vegetation plantings for erosion control in ephemeral upland drainages;
6) restoration of a large acreage invaded by undesirable exotic vegetation;
7) and, wildlife food and cover plantings in disturbed areas adjacent to irrigated hay meadows.

The initiative was characterized by the broad scale of the acreage involved in and affected by enhanced conservation practices. While partnerships were an integral part of the initiative, the effort was led primarily by private landowners from the project area.

Projects were designed and led by the three major private landowners in the area, with assistance and support from the Shell Oil Co. representative and the wildlife and habitat management specialist. A range conservationist and area manager for the Rock Springs BLM District were consulted with and assisted in planning and project design. A habitat specialist for
the WGFD Green River District office, weed and plant specialists with the SCWPD, a reclamation specialist and planting crew from KC Harvey, LLC, and a soil/plant specialist from Granite Seed Co. were consulted, provided site recommendations, and plant materials support. Anne Dowd of ArchaeoLOGIC USA conducted cultural and archaeological resource surveys pursuant to the NHPA, and provided invaluable consultation regarding potential conflicts and remediation on some project sites where soil disturbance occurred during project developments.

Wildlife of the Landscape Area

Over 200 species of birds, mammals, amphibians, and reptiles inhabit the sagebrush-grassland and agricultural land communities dominant in the project area. This report only highlights a few of the species benefiting from the projects presented herein. Mule deer was not one of the principal species of focus in the project, although it was a key species benefitting from projects implemented on private lands to the north and in canyons radiating out to the west from White Mountain Rim along the eastern portion of the project area (MAP 2). Mule deer, pronghorn antelope, elk, and sage-grouse all play an important role in the functioning of the sagebrush dominated landscape. The private ranch and farmland holdings on the northern end of the project area and bordering the sagebrush community, further contribute to the seasonal food, water, and cover resources available to the area’s wildlife. Private land holders were and are integral to the management and continued stewardship of the project area.
MAP 1. Farson, Wyoming Landowners’ "Healthy Lands Initiative" Project Area (within green boundary) - 196,000 acres - Satellite Image, 2016
Map 2. Projects completed within the Farson HLI Project Area, 2009-2016
WATER DEVELOPMENTS FOR WILDLIFE AND LIVESTOCK

Water developments included six new wildlife guzzlers, three existing gas pumped wells converted to solar pumped wells, two new water wells with solar power, and nine miles of new pipeline to replace old pipeline to seven wildlife/livestock water tanks.

Wildlife Water Guzzlers

Construction and Installation

In 2011 six wildlife water guzzlers were installed on the most southern portion of the project area on land owned by the Rock Springs Grazing Association. These guzzlers furnished the only available water for wildlife within an area of about 45,000 acres. Fencing around each guzzler was designed to allow access to wildlife and exclude wild horses and domestic livestock.

Each of the six wildlife guzzlers consisted of a 2400 gallon heavy fiberglass tank, half of which was covered to minimize evaporation. The open part of the tank had rough-surfaced stairs for easy access and to prevent slipping when wet. The guzzler tanks were constructed by Custom Fiberglass Inc., Casper, Wyoming.

- 2400 gallon fiberglass guzzler tank
The tank was fed by rain and snow melt water gathered on a 30 ft. x 40 ft. corrugated tin apron and fed into the guzzler tank by a rain gutter.

The water collection aprons were designed of a sufficient size based on a formula to maintain water through the spring, summer, and fall in a 6 – 9 inch precipitation zone with daily wildlife use. An area was fenced around each guzzler site and designed for low maintenance using all wood posts with a heavy pole top to resist heavy snow in winter, as well as to prevent entanglement with and fence damage by big game. The fence was wildlife friendly for access by all species of wildlife, and excluded cattle and wild (feral) horses. The fences, guzzlers, and guzzler aprons were built and installed by Fence Trac, of Big Piney, Wyoming.
Wildlife Use

After spring rains, the occasional summer and fall afternoon thunder showers filled the guzzlers holding water through the dry summer/fall periods. Wildlife consistently used the water sources on a daily basis. Elk, antelope, mule deer, sage-grouse, and other wildlife species have been, since installation, and will be for the foreseeable future be sustained with these six guzzlers, providing the only water in an area of about 45,000 acres.

During the dry summer periods each year following installation, June through mid-September, 20-30 adult bull elk used the six guzzler tanks on a daily basis. Most elk use occurred at night, late afternoons, and early mornings when it was cooler on warm and hot days.

- Adult bull elk used this portion of the project area in the spring, summer, and winter. In the fall, by early September, these adult bulls moved to the east to White Mountain Rim, the Killpecker dunes, and Steamboat Mountain. In these areas they found cows, where they spent the rut or breeding period, and returned by November. These bulls and some cows and calves wintered in the southern portion of the project area and in the more broken topography in the eastern portion of the project area.
Sage-grouse used three of the six guzzlers on a daily basis in dry periods after the flowering vegetation (forbs) dried out in July.

In dry periods prior to the installation of these guzzlers, grouse in this area moved to water sources greater than four miles from the guzzler locations to water and feed on insects and green vegetation. Within a six mile radius of these guzzlers there were 8 active leks (sage-grouse breeding grounds) with a variation in annual total count for the 8 leks of 350-570 males, 2007 – 2013. Within the 196,000 acre project area there were 12 active leks with a total high count of over 800 males in 2007, between 2007 and 2013.

Several other species of wildlife used the guzzlers in the summer period. Among the most notable were pronghorn antelope, cottontail rabbits, white-tailed jackrabbits, badgers, coyotes, many small mammals, golden eagles, and many small bird species.

Badger in the late afternoon returning from water
Pronghorn antelope coming into water shortly after dark

Following construction the guzzler enclosures were reseeded to native vegetation. Some sites, like this one, responded better than others. This site took three years to respond to native grass plantings. As some sites received increasing elk use each year vegetation re-establishment was not as notable and trampled out by heavy elk use around the guzzler. Note the 2012 and 2014 photos at the beginning of this Wildlife Use section.
Gary Zakotnik (lead rancher) and Fred Palmer (Shell Oil Co. representative) discussing future projects.

Solar Wells

Construction and Installation

Between 2009 and 2014 five solar wells were installed. Solar panels, a fenced area around each set of panels, a solar pump in each well, a water tank, and a bird escape ramp for the water tank were placed at all five sites. Premier Power Plants and Pumps, Co. of Farson, Wyoming installed the solar well components.

Prior to solar panel installation four of these wells required pumping with a diesel generator mounted to a trailer whenever they were used. This made it difficult to provide water to more than one site at a time, and to leave the water on for any length of time to accommodate wildlife and wild horses.

At an abandoned oil/gas well drill site water was found at a relatively shallow depth. After acquiring authorization from the BLM and a water right filing with the State Engineer, a solar pump was installed and a watering system developed for wildlife, livestock, and wild horses.
Livestock and Wildlife Use

The installation of solar wells provided better control of water for managing the seasonal use and distribution of livestock. The livestock grazing in this area is primarily managed by manipulating water on and off periods. Fencing is only restricted to areas managed for riparian habitat protection and intensive control of grazing. These water developments in conjunction with existing water developments and riverine flowages on the northern two-thirds of the area enabled grazing permittees to rotate grazing within a summer grazing season such that portions of the range were grazed at different times and intensities each year.

Overflow areas from stock tanks allow for a water source more accessible, nearer to sagebrush cover and more attractive and secure to sage-grouse hens with broods.

The ability to control water availability and move livestock, allowed some water sources to be turned back on after cattle movement to accommodate wildlife over larger areas in dry periods. Wild or feral horses were also better distributed and exhibited less impact on the range with a better distribution of water, and management of their numbers at lower levels.

Solar wells helped distribute sage-grouse numbers in dry summer and fall periods, alleviating some of the concentration around the agricultural area. Solar well use by sage-grouse during the brooding season, mid-July through mid-August, was documented at almost every well site especially after upland flowering plants dried and insect abundance decreased with hot, dry summer weather.

Livestock and Wildlife Drinking Water Sources Fed by a Pipeline

Installation and Construction

In the summer of 2013 a cooperative project with the BLM to replace nine miles of old pipeline feeding seven wildlife and livestock summer water tanks was completed. This project paid for all of the parts and the BLM provided the labor. This pipeline was fed by an electrically powered well located at the top of White Mountain Rim along the eastern edge of the project area, providing the only water east of US Highway 191 (MAP 3).
From left to right- Art Reese, Fred Palmer, Carson Engelskirger, and Gary Zakotnik with White Mountain Rim in the background and where the well feeding the pipeline and seven water tanks is located. A pipeline pressure relief valve is on the left.
Livestock and Wildlife Use of the Water Tanks Fed by the Pipeline

The many canyons emanating from White Mountain Rim (MAP 3) and the benches between the canyons, provide habitat for mule deer through the spring, summer, and fall. Elk cow/calf herds are often seen in the area spring through fall. A few cow elk have their calves on the benches between the drainages and at the heads of drainages. Elk winter along the rim and southern exposures in the drainages. The elk and deer along the eastern edge of the Project Area utilize one or more of the water tanks fed by this pipeline on a daily basis, as these tanks supply the only water for the Mountain Rim, as seen in MAP 3. The nearest water from these sites are in the agricultural project area. One large sage-grouse lek is located in the area, and accommodates over 50 breeding males annually in recent years. Sage-grouse broods use some of these well sites in drier portions of summer and fall. In the winter several hundred sage-grouse winter at lower elevations along the western flank of the rim. On the eastern portion of the Project Area between US Hwy 191 and White Mountain Rim there are no wild horses.

Pronghorn antelope were found in the area, using the water tanks in summer, and wintering in the area in milder winters. In deep snow and extreme cold winters mule deer and antelope migrate into Killpecker Basin through the very northeastern portion of project area. Antelope and deer migrated from areas to the north of and along the Wind River Front and Big Sandy/Elkhorn/Prospect Mountain/Monument Ridge country.

This young doe mule deer was observed bedded in a canyon leading to one of the water tanks. Bucks and does with fawns were often seen in this area in early morning hours. Much of their consumption of water occurred at night, and their activity was confined to the cooler hours of the day to save energy.
These twin mule deer fawns were observed near one of the water tanks fed by the pipeline, and were believed to be using a tank on the northeastern portion of the project area.

Note the sage-grouse and small bird escape ramp in this pipeline fed water tank. Also note the float preventing water from flowing over the tank and allowing multiple tanks to be filled simultaneously and water from the well conserved.

Note the sage-grouse hen with a chick in the foreground.
RIPARIAN HABITAT EXCLOSURES BELOW ARTESIAN FLOWAGES

Installation and Construction

In 2011 FenceTrac LLC., Big Piney, Wyoming built fences at the out-flowages of two flowing artesian wells and one stock pond fed by a solar well. Dr. Anne Dowd of ArchaeoLogic USA conducted the cultural assessments at all proposed newly constructed fence sites and reported results to the BLM. We were then given clearance with some modifications in location at fence construction sites.

At each site water tanks were provided to livestock and wild horses at the water source. At out-flowage below each stock tank an area of 2.5 to 11.5 acres was fenced around the flowage water source. The two artesian flowages had fenced areas of 8 and 11.5 acres. The flowage from the solar well fed stock pond was 2.5 acres in size.

The fences were designed to be wildlife friendly and low maintenance. The fences allowed for pronghorn antelope, mule deer, elk, sage-grouse and other wildlife entry; however, excluded wild horses and livestock. The fences were also designed so that once every five to seven years livestock would be allowed one day of fall season access to the protected area, which would trample residual vegetation build-up and fecal material to enhance nutrient cycling, assist in noxious weed control, and to create a seedbed for native plant germination.

- Wild horses at an artesian out-flowage before fencing and a lack of security cover for sage-grouse using the site for watering in dry periods. Water resources for wildlife and livestock over a great portion of the sagebrush landscape in central and western Wyoming are often limited to human-developed sources.
Oil and gas drilling exploration and development activities over the last five decades have played an important role in the creation of water for wildlife, wild horses, and livestock in a very arid landscape. Wyoming has the largest expanses of cold high-desert sagebrush habitat in the United States. Prior to the human development of water for livestock and wildlife in the broad expanses of Wyoming’s sagebrush desert the wildlife’s need for water in the dry summer and fall season was relegated only to a few natural springs and major perennial streams and rivers, which in many cases were great distances from the desert’s central expanses.

- Two artesian wells in the project area were developed by oil and gas companies from the drilling process for oil and gas in the 1970’s and 1980’s. An artesian well on the northern portion of the area was developed by a Trona Exploration Company. Texaco Co. was one of the early oil companies exploring and developing natural gas in this area. Today Chevron leases the natural gas currently being developed in the northwestern portion of this area.
Wildlife Use of the Exclosures Following Fencing

The installation of these riparian protection sites helped restore and preserve herbaceous and shrub vegetation as security cover for sage-grouse and other small birds using these sites to water. Livestock and wild horses could still access the water tanks outside the exclosures and wildlife could drink more securely within the exclosures.

- The green vegetation supported by moisture adjacent to water within the exclosures were also more conducive to better insect production, especially benefitting sage-grouse.

- Fred Palmer of Shell Oil is inspecting the habitat created in one of the artesian exclosure sites in the third year following fencing and exclusion of livestock and wild horses.
By 2015, the fourth year following construction of the riparian exclosures, considerable cover, water, and food resources were provided sage-grouse and other wildlife using the exclosures.
Throughout the project area on all of the new water and riparian habitat project sites sage-grouse broods were surveyed each year, beginning three years prior to development. Prior to development there were no sage-grouse broods observed using these sites in a mid-July brood survey period. After development each new water site received daily use by two or more sage-grouse broods in the same survey period.

- Each successive year following construction of the riparian exclosures use of the sites by sage-grouse with broods increased.
SHRUB PLANTINGS FOR MULE DEER USE IN WINTER

Background of the Past and Current Situation

In the canyons radiating down from the White Mountain Rim on the eastern edge of the project area and along Alkali Creek on the southern end of the project area, we recognized a potential to increase winter habitat for mule deer (MAP 2). In these areas southern exposures, receiving increased radiant energy from greater exposure to the sun in winter. The ridgelines exposed by wind could become more important to winter use by mule deer, if shrubs were planted that would be of added benefit to existing sagebrush cover and a good food resource for deer. For example, on the White Mountain Rim some mule deer have historically wintered taking advantage of the southern exposure and ridgelines. Some remnant stands of serviceberry, a preferred winter food plant for deer, were found in this area.

Along Alkali Creek and some of its side drainages, it was recognized there was a potential to increase shrub diversity for mule deer in winter and over the long-term add habitat more attractive to winter use by mule deer, and also benefit elk using the area in winter. All shrub seedling and shrub seed plantings were conducted on private land owned by the RSGA. Don Schramm, their manager worked with us on the plantings. It should be noted that the lands in the central portion of the checkerboard land receive little to no use by domestic livestock in most years; although, in some years sheep use a portion of the area in early summer and fall. The periphery of the area is grazed by sheep in the late spring and fall when being trailed to and from lambing pasture near Cokeville, Wyoming.

- Mule deer in early spring on top of White Mountain Rim and moving into the project area to feed and water.
Seedling Shrub Planting Operation

In the early spring of 2013 (late April) 750 serviceberry seedlings and 1300 curled-leaf mahogany seedlings were planted by KC Harvey Co., WMSR, and volunteers from the Rock Springs Chapter of the WSFW, and a representative from the local MDF chapter. Seedling shrubs were acquired from Conservation Seeding and Restoration, Inc., Colorado.

These seedlings were planted with a repellent for deer, elk, rabbits, etc. *Mycorrhiza* fungi was also placed with each seedling. The sites selected were on soils most conducive to curled-leaf mahogany and serviceberry plant establishment. Three sites were used for curled-leaf mahogany and three sites for serviceberry. All of the sites were relatively harsh with wind-blown conditions. The mahogany sites were also in more calcareous, shallower soils usually frequented by curled-leaf mahogany, and where if established would be available to mule deer in the winter. The serviceberry sites were in deeper soils, southern exposures, and along a pipeline with many interspaces where competition with existing vegetation would be reduced.

There was some snow on the ground the first two days of the planting operation. When the snow melted, the weather turned warm and dry. All of the plants were watered within four days after planting and after the first six inches of soil had dried. The warm, dry weather continued for the remainder of the spring on the planting sites with only infrequent afternoon showers. The plants were watered five times between planting and June 1st. There were intermittent rains in June. The remainder of the summer was relatively dry and hot.

Seedling Shrub Survival

After planting, observations were made during trips to water the seedlings. It was noted that dessication had occurred on many plants and that many plants had been pulled up by elk, deer, and antelope. By July 22, three months after planting, about 19.1% of the serviceberry plants on three sites and 3% of the curled-leaf mahogany seedlings remained with green leaves. On June 12, 2014, 14 months after planting about 4.9% of the serviceberry and less than .5% of the mahogany seedlings had green leaves and live roots. Survival was believed insufficient to increase the scale of seedling plantings and to follow-up with further plantings, especially should the coming spring and summers remain dry. It was anticipated that so few plants remained they would be selected for by big game and survival would dwindle be gone within two years.

- Crew planting seedlings in late April, 2013
The crew watered individual seedlings for the first 5 weeks after planting. About one year after planting survival was deemed too low to conduct further plantings.

**Seeding Four-Winged Saltbush for Mule Deer and Elk**

Although mule deer use was relatively limited along Alkali Creek on the southern edge of the project area, it was believed there was some potential to inter-seed four-winged saltbush and over time provide new winter forage to attract mule deer. Four-winged saltbush and winterfat (native plants), introduced on some sites in this drainage could also serve to out-compete, halogeton, a noxious weed with little or no value to wildlife, wild horses, and livestock as a food resource. Winterfat and Gardner’s saltbush were both species found in the Project Area; however, in this particular portion of the area heavy winter use of these species by wild horses, whose numbers exceeded the BLM’s management objective, appeared to have resulted in an increase in halogeton and a decrease in the more preferred Gardner’s saltbush and winterfat.

Once established on selected sites in the Alkali Creek drainage a seed source for these plants would be provided and over the long-term potentially increase in area of coverage within the drainage. Monitoring big game use of these sites was not within the scope of time provided in this project. Monitoring was primarily limited to the success or failure of the seedings. (MAP 2) identified the areas where the seedings took place, and included about 4 linear miles and a total of approximately 12 acres in area on southern exposures and adjacent to the drainage bottoms. The seeding operation was conducted in mid-December, 2013. All seeds used in the seeding projects were acquired from Granite Seed Co., Utah. Daryle Bennett, a soils and reclamation specialist for Granite Seed Co., also provided invaluable information on seeding rates, seed varieties, planting schedules, and species identification differences between four-winged saltbush and Gardner’s saltbush in the early seedling stages of growth.

KC Harvey Co., Bozeman, Montana, conducted the drilling and some of the seed broadcasting on many of our sites in December, 2013. There were some Gardner’s saltbush plants on the seeded sites, but as mentioned earlier, was believed to be of insufficient density to provide significant competition from a drilled inter-seeding of four-winged saltbush.
A Truax Flex 2 range drill was used to seed about 8 acres in one area, and 4 acres in another area were broadcast seeded using an ATV mounted broadcast seeder. Four-winged saltbush seed was planted in this manner. A follow-up, hand broadcast of winterfat seed was conducted after the saltbush planting on some sites within and adjacent to the saltbush seedings.

Seeding occurred on the borders of drainage bottoms and southern exposures bordering the drainage. This photo of the four-winged saltbush seed being drilled is on a southern exposure, and was more devoid of deep snow in most winters and typifies the kind of habitat that with saltbush plants available as a food resource could be used by mule deer in some winters.

By spring 2014 young four-winged saltbush was observed germinating on many of the sites planted to four-winged saltbush. However, heavy elk use was noted on most of the young four-winged saltbush plants that first spring. It wasn’t until one year later in the spring of 2015 that Gardner’s saltbush and winterfat were noted in abundance and domineering the planted sites. Four-winged saltbush was no longer noted by the second year.
Four-winged saltbush, the species we inter-seeded, was not evident on the drilled and seeded sites by the second growing season, 2015. Gardner’s saltbush occupied the remainder of area on the planted sites. Winterfat occupied much of the area it was broadcast adjacent to the sites drilled and seeded with four-winged saltbush. So why did the Gardner’s saltbush respond, instead of the inter-seeded four-winged saltbush? It is believed that the planter drill’s soil disturbance may have created the conditions that stimulated germination of Gardner’s saltbush seed already present in the soil on many of these seeded sites, as well as stimulated the vigorous growth of any existing Gardner’s saltbush plants. The heavy elk use on the young four-winged saltbush plants may have killed most of the young seedlings that first season of growth. It is anticipated that there may still be viable four-winged saltbush seed in the soil that could germinate since planting in December, 2013. Young seedlings of four-winged were also believed to have survived in low abundance, but not observed in our 2015 and 2016 survey of the area. A trip to the area will be made in early summer, 2017 to determine whether there are any new seedling four-winged saltbush plants or older four-winged saltbush plants that may have survived and not previously observed. The soil will also be screened to determine whether there is still viable seed in the top soil.

- In this open stretch of drilled and seeded soil (bounded by sagebrush on both sides) Gardner’s saltbush was dominant in the foreground (darker green) and winterfat in the background (lighter green/grey). The photo was taken in July, 2016, two years post-seeding.

- Another area with similar seeding results, as the previous photo. Winterfat seed broadcast in areas drilled in the winter of 2013 was also successful in germinating and becoming established in both pure stands, as well as mixed with the saltbush species. Typical Gardner’s saltbush response after two years at four-winged saltbush seeded sites where drilled and inter-seeded in 2013.
Winterfat seed which was broadcast on some southwestern exposure sites in the Alkali Creek drainage did succeed, and became most notable in 2016, three years after planting. It was also noted in 2016 that on some sites previously dominated by halogeton, Gardner’s saltbush was out-competing and spreading into some of the halogeton stands. Halogeton is generally an annual, whereas the saltbush and winterfat species are perennial and would typically out-compete halogeton once established.

- Lighter green plants were Gardner’s saltbush, and were taking over the site once dominated with halogeton (darker green plants right center). This site is a southern exposure in the Alkali Creek drainage and with these new saltbush plants could furnish winter forage for mule deer, elk, wild horses, and domestic sheep in winter.

- Gardner’s saltbush

- Winterfat
Twenty to thirty bull elk were found on the southern and eastern half of the Project Area summer and winter.

Cow and calf elk were often seen in the drainages below White Mountain Rim (along the eastern edge of the Project Area) in the winter and early spring. By calving time in early June only a few cows were left in the area, calving at the head of some of the canyons on the eastern and northern end of White Mountain Rim.
PLANT SEEDINGS FOR EROSION CONTROL

There were areas on the southern portion of the project area on checkerboard lands (i.e. Alkali Draw drainage) where basin wildrye, a native grass species with a robust root structure, has played an important role in abating erosion and healing severely down-cut reaches of upland intermittent drainages. On BLM lands to the north of the checkerboard lands in the project area, erosion in similar drainages has resulted in significant down-cutting over the years. To ameliorate the down-cutting over the long term, broadcast seedings of basin wildrye and thickspike wheatgrass were conducted in December, 2013. These efforts were aimed at mimicking the long-term results observed in the aforementioned reaches of Alkali Draw by the natural process influenced by basin wildrye. It should also be noted that basin wildrye is a fire tolerant grass, and germination of dormant seeds or revival of dormant roots present in bottom land soils can be stimulated by fire. There is evidence that fire has been an important part of the Alkali Draw system in more recent years; suggesting that some moister and deeper soil sites in draws with a sufficient abundance of fuels to carry fire have a greater tendency to cycle with periodic flushes of basin wildrye and be less prone to erosion. Prior to the implementation of this project and other projects identified herein on BLM lands, an EA Report was conducted by the BLM Range Conservationist and approved by the Rock Springs District of the BLM. This assessment approved the broadcasting of seed for this erosion control project, as well as the noxious weed control and habitat restoration project to be discussed later in this publication.

About 12 linear miles of eroded intermittent drainages in Stagecoach and Starvation Draws, located in the central portion of the Project Area, were broadcast seeded in December, 2013 with basin wildrye and thickspike wheatgrass seed (MAP 2). Within those 12 miles sites relatively bare and devoid of live plant material along eroded banks were broadcast seeded at a rate of 20 pounds/acre with a mix of 50/50 thickspike wheatgrass and basin wildrye.

- An example of past down-cutting and erosion in the Starvation Wash drainage. This is typical of the most severe down-cutting discussed. In more recent years with well-managed livestock grazing and lower wild-horse numbers signs of healing are beginning to show with the establishment of shrubs on sloughed banks and on some bottom soils.

The goal in this phase of the project was to establish the basin wildrye vegetation and seed source to begin the process of healing eroded draws along Stagecoach Draw and Starvation Draw.
These photos from Alkali Draw demonstrate the role basin wildrye can play in erosion abatement in highly erosive bottom soils over the long-term in the upland intermittent drainages most affected by severe summer storm events and rapid snow-melt runoff.

It is anticipated that once a seed source is established the erosion downstream of the seed source would begin to heal, given no catastrophic die-offs of the seed source. This process may take many years and will be monitored by the Project Ranch leader leasing this allotment. If the erosion in the erosion prone soils of these drainages could even be partly decreased there could be a long-term decrease in silt-loading from the Stagecoach Draw into the Big Sandy River and ultimately the Green River. Although, it is recognized that such a process is slow, it may be difficult to measure with conventional methods, and may take many years to demonstrate the effectiveness of such efforts.

By spring 2014 there was germination in some portions of the seeded area by the thickspike wheatgrass. The thickspike wheatgrass can provide the initial effect of slowing down runoff until the basin wildrye is well established in subsequent years. However, as with many such projects unusually high water volumes and extended runoff events occurring before the establishment of good root growth to hold the soil, as well as extreme drought and poor conditions for seed germination could nullify these efforts. It is believed that this would be a good time to inaugurate such efforts with the recent history of spring and early summer rainfall, and the lack of recent high volume storm water run-off events.
In the initial spring germination period, following the prior winter seeding, the thickspike wheatgrass was found on many stretches of the 12 miles covered in the seeding operation. The sagebrush plants beginning to inhabit the sloughed banks in recent years, also serve to slow the erosive action of runoff water, and creates protected sites to aid in the germination and establishment of the grass species. The soils in these draws are highly erosive and healing takes a lot of time. Rapid, heavy rain and winter snow melt runoff events in the early stages of healing can set back the process.
Basin wildrye has a strong root structure, once established, and can slow the effects of high volume run-off water in storm events and during spring snow melt. By 2016, two years following the initial germination year of 2014, basin wildrye was beginning to become evident on a few sites. The wheatgrass was well rooted and was beginning to spread its rhizomes. This is the first phase of filling in of eroded draws with perennial grass vegetation. It should be noted that it is not unusual for basin wildrye seed to lie in the soil dormant and not germinate for several years, waiting for the right soil moisture and temperature conditions.
HABITAT RESTORATION OF A LARGE AREA INFESTED WITH NOXIOUS WEEDS

In the summer of 2013, after the approval of the EA Report by the Rock Springs BLM, the SCWPD began control efforts on about 350 acres of giant whitetop (a noxious exotic weed species). This stand of giant whitetop was located on a playa basin with a high water table and alkaline, clay soils. Whitetop was first introduced onto the site sometime after the conversion of the nearby agricultural area from flood irrigation to sprinkler irrigation in the 1980’s. Flood irrigation maintained a high ground water level in this basin, and when flood irrigation was replaced by sprinkler irrigation the ground water table in this playa basin was lowered. During this period whitetop was introduced into the irrigated farmlands and spread into the playa.

- A mature giant whitetop plant inside this range cage (example demonstrating the dense nature of whitetop and its ability to out-compete native rangeland plants once established). In this intermittent drainage the white-top is kept at bay by intermittent summer livestock use. If this site would not have been grazed when the whitetop invaded and maintained at a fairly high intensity of grazing, the site would have become dominated by whitetop.

- A portion of the 350 acre playa basin with a dense stand of giant whitetop. Almost no other plant species is found in this stand because of the strong root system and very competitive nature of whitetop, a perennial species.
In the fall of 2013 the SCWP Farson, Wyoming sprayed one-half of the white-top stand. In November, 2013 a crew from WMSR and K.C. Harvey Co. broadcast seeded about 180 acres with basin wildrye and thickspike wheatgrass at a rate of about 15 lbs./acre (a 50/50 mix of the two species). The seed was broadcast because of concerns by the BLM cultural resources specialists about disturbing any artifacts in the area with soil tillage and drilling the seed.

- Broadcast seeding from an ATV in November, 2013.

The following summers of 2014 and 2015, the remaining stand of whitetop was sprayed. A broadcast seeding was conducted in December, 2015 and January, 2016 with a seed mix of thickspike wheatgrass, western wheatgrass, bottlebrush squirreltail grass, Palmer penstemon, winterfat, Indian ricegrass, and four-winged saltbush. The application rate for this mixture was about 15 lbs./acre.

- By mid-July, 2016 the seedings from early winter 2013 and 2015 were beginning to become apparent.
Three thickspike wheatgrass, basin wildrye, and bottlebrush squirreltail plants from the seedings of 2013 and 2015 were beginning to become established throughout the area by summer, 2016. Evidence of other species, like four-winged saltbush and winterfat broadcast in 2015 were not yet evident. Yellow Foxtail grass had invaded the site by 2016 and was mixed in with the seeded plants.

It is anticipated that after the heavy winter snowfall of 2016-2017 further germination of the dormant seeds from these plantings would result and contribute to native plant recovery and range/habitat restoration. If required, some maintenance and adaptive management money may be used to conduct a follow-up planting of bare spots in the restoration area. The Weed and Pest District will conduct spot spraying of whitetop if required.

In the dry, arid cold desert environment the ground cover of vegetation is sparse as compared to higher precipitation environments. Re-establishment of vegetation on disturbed soils takes longer and may require several attempts in successive years, especially in drought spring and summer conditions. Reclamation and restoration of these soils with native perennial plants is often dependant on having at least two good spring and summer periods with good moisture, the first spring to get adequate germination and early root establishment and the second spring to get a strong root system established. However, the seeds of many perennial species of plants may lie dormant in the dry cold, desert soils not germinating until the spring temperature and moisture conditions are right. The author has observed this on many sites through his years of experience in Wyoming’s cold sagebrush desert.

Once fully restored wildlife and livestock forage values of the site will be enhanced. If the whitetop does not re-invade and the seeded species can become firmly established some native plants abundant around the periphery of the basin and adapted to these heavy soils will also become established (eg. geasewood, Gardner’s saltbush, and winterfat).
RANGE AND HABITAT RESTORATION OF AN INTERMITTENT STREAMBANK AND OLD RESERVOIR SITE ON STATE OF WYOMING LAND

In 2013 the SLIB authorized approval for the partial range/habitat restoration of an area along an intermittent stream going through a State land section leased by Gary Zakotnik, the lead rancher in this project. In December, 2013 about 19 acres bordering an intermittent stream was inter-seeded with a Truax range drill by K.C. Harvey Co.’s range reclamation team. A mixture of basin wildrye, dryland (Falcata) alfalfa, and cicer milkvetch were planted at a rate of 0 lbs./acre. Some follow-up management will be required on this site (MAP 4).

- Looking onto the old Washington Reservoir bed with the dry intermittent drainage going through it in 2010 prior to any vegetation seeding. Seedings and new plant establishment on dry sites in this precipitation zone are very challenging and very dependant on getting good spring and early summer moisture for germination and root establishment.

- The same intermittent drainage below the dry reservoir bed. In this condition, prior to vegetation plantings, the edges of the creek (riparian zone) and adjacent upland dry sites had few herbaceous plants desired by livestock and wildlife. With the establishment of new grasses and flowering (forb) plants this area will become more attractive to wildlife.
In December, 2013 about nineteen acres bordering the intermittent stream was drilled and seeded to plants more preferred by wildlife and livestock. The leasee of this state section agreed to restrict livestock use to the fall to allow new seedings to become established and maintained.

In the spring of 2014, following the 2013 winter planting, some evidence of new grass germination was observed on some sites.
By spring, 2016 the dry reservoir bed had begun to flourish with a variety of new herbaceous plants. The early spring of 2016 was a good moisture period. Some basin wildrye was evident; however, other plants invading the site included rabbitbrush, yellow foxtail, and giant whitetop. Giant whitetop was a recent noxious weed invader and will compete with new growth of vegetation we planted. The weed and pest personnel have planned to do some spot spraying of the whitetop in 2017, and help relieve competition with more desirable planted species.

The tall grass clumps seen in this photo were basin wildrye, a result of our winter, 2013 drilling and seeding operation. This site was typical of both sides of the intermittent creek downstream of the Old Reservoir.
This photo captures some of the basin wildrye that blew in to the sagebrush site on the downwind side of the drainage after heavy winds following the December, 2013 planting.

It is anticipated that the basin wildrye and thickspike wheatgrass seed remaining in the soil will germinate and become better established along the stream course over the next two years. The dryland Falcata alfalfa seeded in 2013 has not shown any evidence of germination to date; however, it is hoped that some of that seed will germinate and plants established given a good moist spring in 2017 and 2018.

WILDLIFE HABITAT ENHANCEMENT ON PRIVATE FARMLANDS

Many wildlife species use the agricultural croplands bordering the sagebrush, yearlong. Ranchers in the Eden-Farson Agricultural area live with and appreciate the wildlife using their lands. In some years summer and winter depredation of the crops also important to their livestock operations occurs and is tolerated by the landowners in most situations.

In extremely dry spring and summer periods the haylands and watering areas within the farmlands become very important to the pronghorn antelope, mule deer, sage-grouse and other species in the area often drawing large numbers of these species onto the croplands. In harsh winters hundreds of deer and antelope are drawn to the area and compete with livestock for stored hay resources. Within the edges of the agricultural area in our project area, throughout this project and for two baseline data collection years prior, 2007–2016, each summer we observed 70–125 antelope, 300–450 sage-grouse, and 25–40 mule deer using the croplands and cropland edges mid-July to mid-August each year. In the extremely harsh winters of 1971-72, 1978-79, and 1983-84 throughout the agricultural area hundreds of deer, antelope, and elk migrated into the agricultural area, fed in haystacks, and also fed on the livestock feedlines.
Lying between the irrigated haylands and the sagebrush habitats were dry areas with an abundance of herbaceous plants (many noxious weeds) and grasses with only limited value to wildlife and livestock. Although there were several areas like this along the northern end of the project area and bordering the croplands, one 40 acre tract located on property owned by Mr. Steve Tomich, was selected as a candidate for improvement by introducing more desirable dryland forbs (flowering herbaceous plants) and grasses. This particular parcel bordered a sprinkler irrigated hayfield that received annual spring-fall use by as many as 85 antelope and 10-20 mule deer. In the mid-summer through early fall it received use by as many as 300 sage-grouse (MAP 4).

A female sage-grouse watering in a puddle created by an irrigation sprinkler. Sage-grouse move to the irrigated farmland edges when the upland native herbaceous vegetation dries by mid-summer. Here they remain until early fall where there is an abundance of water, as well as, insects, and green herbaceous vegetation as a food resource. They will remain in these areas until the fall rains and snows.

By converting the less desirable food plants on the dryland area bordering the hayland to more desirable food and cover plants we believed this project could relieve some of the cropland depredation and damage by the sage-grouse and antelope, and still provide some supplemental forage for livestock in winter. Livestock winter use of a newly established grass and forb field would also help trample in seeds of beneficial plants, creating seed germination sites, as well as mixing trampled fecal and plant matter into the soil, completing the nutrient cycle important to plant stand maintenance.

Mule deer bucks feeding in a sprinkler irrigated alfalfa field in the project area. There is a resident number of mule deer that inhabit the croplands and cropland edges yearlong, as well as the nearby Big Sandy river riparian system, and the expanses of basin sagebrush bordering the eastern portion of the agricultural area.
A herd of antelope feeding in the alfalfa field next to the dryland acreage being improved (middle ground of dried vegetation). Photo taken two years prior to planting and improvement.

The 40 acre dryland parcel bordering the alfalfa hay field that was reseeded and planted in December, 2010 and again in December, 2013.

The 40 acre dryland parcel was planted in two stages. STAGE 1: In December of 2010, the field was lightly disked and Russian or forage kochia was broadcast. The forage kochia germinated over the next three growing seasons and was scattered throughout the area among a dense stand of American kochia and Russian thistle. Although not a native species forage kochia is recognized as a preferred big game, livestock, and sage grouse brood forage plant where it has been planted throughout many areas in the west. This field was not treated with herbicides before the project was initiated. It can be a demonstration area for use of this technique on other disturbed dryland sites bordering irrigated croplands in the irrigation district.
STAGE 2: In December, 2013 the field was inter-seeded with a Flex II Truax rangeland drill. It was inter-seeded with a mix of slender wheatgrass, thickspike wheatgrass, valvilof Siberian wheatgrass, and Indian ricegrass.

➤ Stage 1 was completed in December, 2010 and consisted of a broadcast no-till seeding of forage (Russian kochia) as a food plant for sage-grouse, big game, and livestock.

➤ Stage 2 was completed in December, 2013 by inter-seeding a mix of grasses.

➤ Forage kochia remained in sparse stands, interspersed with noxious weeds after Stage 1, until the spring following the Stage 2 planting.
By the summer of 2016 about 75% of the 40 acre field exhibited a mix of forage kochia, Indian ricegrass, slender wheatgrass, and valviolof Siberian wheatgrass. It is anticipated that in the spring of 2017 and 2018 the remaining 25% will also respond with a mix of these species.
From another angle looking across the newly planted field, note the stand of Indian ricegrass (straw-colored plant) from the second seeding and the forage kochia (green plant) from the first seeding (Stage 1). This photo was taken in 2015, and as noted in the previous 2016 photos the field had filled in with more seeded species and at a greater density by 2016.

Sage-grouse along the edge between the newly planted area and the alfalfa field.
Sage-grouse using the newly planted field. Note the forage kochia.

Mule deer using the edge of an irrigated hayland. There are many field edges that have good forage and cover for wildlife and some that could be improved for wildlife and livestock. The methods we have used could be used on a larger scale throughout the Eden-Farson irrigation district.
CONVERSION OF A FENCE TO A “WILDLIFE FRIENDLY” FENCE

Along the periphery of the Eden-Farson irrigated lands are fences separating private lands from BLM and BOR lands. One stretch of fence on the northern end of the project area, which was five and six strand barbed wire in many sections, was converted to a “wildlife friendly” four strand fence. This stretch of fence was 6.5 miles in length. The fence was modified to allow unrestricted movement of pronghorn antelope beneath the bottom wire, and marked to make it more visible to birds like sage-grouse and sandhill cranes in the spring through fall period. The top strand was dropped in height to minimize the probability of mule deer becoming entangled in the fence in the winter and spring periods when the animals are weakest from the winter cold and snow (MAP 4).
This is a five strand barbed wire fence before modification in 2014. The lower wire was near ground level making it difficult for access by antelope, which prefer to negotiate fences by going under the bottom strand. The top strand was between 48” and 52”.

After modification the fence was lowered to 42-inches, the bottom wire was raised to 18-inches above ground level, one strand of wire was removed, distances between wires modified, the bottom strand was replaced with a smooth (barbless) wire, and white markers were installed for sage-grouse.
DISCUSSION

Long Term Maintenance and Adaptive Management

The remaining project funds were transferred to the MDF by the WWNRT at their headquarters office in Salt Lake City, Utah. These funds would be used for the following over a ten year period (2017 – 2026):

1) Annual maintenance and repair of guzzlers and guzzler fences.
2) Maintenance and repair of artesian outflow riparian fences.
3) Maintenance and repair parts for solar panels, pumps, and electrical systems (labor will be provided by livestock grazing permittees)
4) Ten year agreement with Rock Springs Grazing Association for guzzlers.
5) Maintenance and repair of existing livestock and wildlife water sources not covered in the previous projects (i.e. install solar pump, panels, and electrical system in a seasonal flowing well to extend period of water availability to wildlife and livestock).
6) Install a new pipeline to water tanks in Stagecoach Draw. This project would pay for materials and BLM would provide equipment and labor.
7) Some follow-up broadcast seeding, if required, on the noxious weed control area.

Responsibility

Long-term Maintenance – 2017 – 2026 -- assignments (or contracting) for and payments for maintenance would be the responsibility of the MDF.

Adaptive Management for Follow-up Seeding Associated with seeding projects if required in 2017 and 2018 – Assignments and responsibility for completion will be by Dave Lockman of WMSR. Dave Lockman will provide labor at no cost to project for monitoring to determine need for additional seeding and seed will be provided by maintenance money if required.

Maintenance and Repair of Existing Livestock and Wildlife Water Sources and Installation of a new pipeline not Covered in the Current HLI Projects – These will be supervised and managed by Gary Zakotnik, using contractors as required. Gary Zakotnik’s time will not be charged to the project.

CONCLUSIONS and SUMMARY

As mentioned earlier, this was, and is not, and was never intended to be a research project. This publication was designed and published for use as a tool to anyone working on and with the land. It was not intended to be technical document with technical jargon, a dissertation on data, a statistical analysis, and literature cited. It is a wildlife, livestock, and habitat management project. Baseline data on wildlife populations, agricultural land use, oil and gas land use, and range/wildlife habitat; as well as a collection of prior intimate knowledge of the landscape, its historical and current land use, and generational experiences from living and working in this environment defined this project. The most important aspect of this project were the many people including: agency personnel, ranchers/grazing permittees, MDF, Shell Oil Co., WWNRT, and others who came together and collectively made this happen.

This project is unique in the sense it was voluntarily initiated and funded by an oil and gas company (Shell Oil Co.), sponsored by a leading national conservation organization (MDF), endorsed by the Wyoming Governor and the WWNRT, and led by landowners and a Grazing
Association (RSGA) who collectively designed and had an active role in enabling the planning, development, and implementation of the major projects.

This landscape area is a working landscape. One in which the land is providing for many of man’s needs and those of other living things. This project provides an example of how communities of people living close to and working the land can be leaders in problem solving and good stewardship. It demonstrates how governmental entities and their specialists can serve the people working the land in ways that are positive to benefit the land without being over-regulatory and burdensome. In the case of this landscape level stewardship project, the landowners took a lead role and the governmental agencies only provided support when needed, whether to provide scientific and specialist support or support to meet legal requirements.

Small businesses, based in the local community, were involved in the construction efforts and assisted in project planning and management, thereby assisting the local economy. Shell Oil Company demonstrated their connection to the agricultural community and natural resource community in meeting the needs of people and wildlife by proposing, initiating, and providing the bulk of the money used to leverage other cooperators in the project.

The WWNRT was an invaluable asset to the project by providing cooperative financial support on wildlife associated projects. Although the mule deer was not a major species emphasized in the project, they were one of the species benefitted.

Mule deer, antelope, elk, and sage-grouse are among the many species benefitted by good stewardship practices in the sagebrush community. These species can all thrive in this landscape with a continued working relationship between agriculture, oil and gas exploration and development, and outdoor recreation with “due diligence” in the exercise of good stewardship and management practices by those working in the Eden-Farson community.

The projects completed in this “HLI” have demonstrated many techniques that can be used by industry and landowners to enhance and restore livestock and wildlife range/habitat. The seeding projects used here for erosion control and management, restoration of sites occupied by noxious weeds, big game winter habitat enhancement, and farmland range/habitat restoration on dry sites were all applicable to similar low precipitation areas and soils in Wyoming. Wildlife water guzzlers with large enough collection aprons and sufficient sized exclosures can benefit both small game, non-game, and big game when placed in water deficient areas.

The authors believe that this project is one example of Cooperative Conservation which results in local solutions to complex management issues on the landscape. We hope that private working lands that depend on federal lands and other multiple use users of the land can work together to benefit local economies and wildlife populations.
The Farson Landowners’ “Healthy Lands Initiative”
A Unique Conservation Initiative on a Working Wyoming Landscape
Sponsored by Shell Oil Company and the Mule Deer Foundation