

SHERIDAN REGION

HABITAT PROJECTS

Lake DeSmet Conservation District Sagebrush/Grassland Habitat Restoration Program

The Lake DeSmet Conservation District (LDCD) has partnered with private landowners, Natural Resource Conservation Service (NRCS), Wyoming Game and Fish Department (WGFD), oil and gas industry, conservation groups and federal and state governments to restore the productivity of sagebrush/grassland communities in northern Johnson County. This community-based program has had tremendous success. So far, 234,661 acres are enrolled to enhance important habitats for sagebrush obligates, mule deer, pronghorn antelope, other wildlife, as well as livestock (Figure 1).

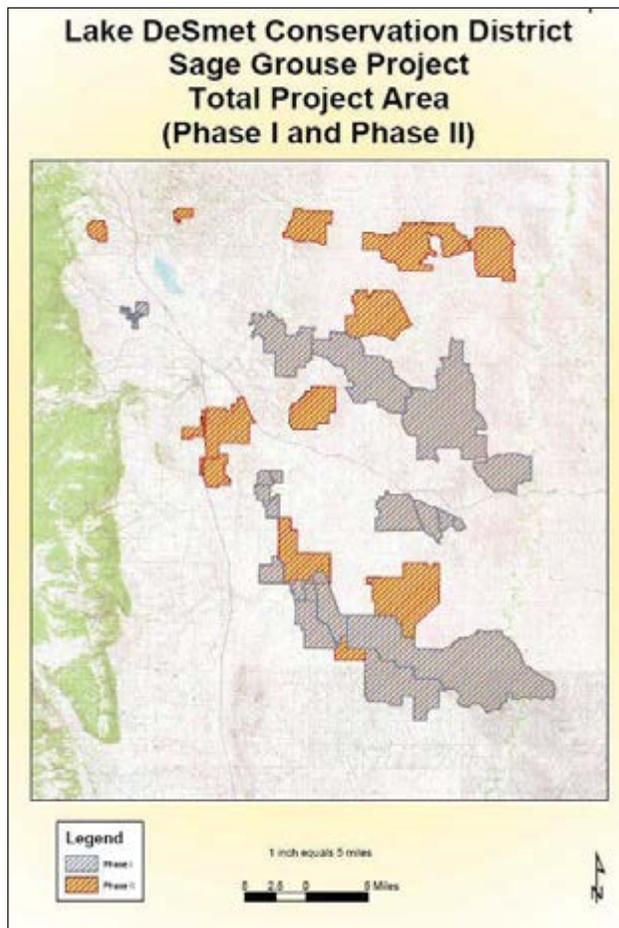


Figure 1. The first ranches to sign up for the program involves 143,501 acres (Phase 1). The second enrollment (Phase 2) added 91,160 acres to the program. A third signup period is presently underway. If all are approved, the total project area will exceed 320,000 acres.

The first phase of this program involved seven landowners comprising 143,501 acres. Ranch management plans have been prepared for these livestock producers, which includes; resource inventories, conservation strategies, infrastructure needs (to implement conservation strategies), grazing procedures and monitoring needs. Dr. Roy Roath, a Colorado State University range extension specialist, and other experts in the field have been employed to assist with progressive plans that will benefit both livestock and wildlife.

- 234,661 acres are enrolled to enhance important habitats for sagebrush obligates, mule deer, pronghorn antelope, other wildlife, as well as livestock.
- 4,950 acres have been treated with the Lawson Pasture Aerator.
- Interns spent much of the summer mapping sage grouse.
- Range Pitter used to treat 300 acres on the Kerns WHMA.
- 200 acres of grassland, ninebark and chokecherry shrubs were burned on the Kerns WHMA.
- Escape ramps are being installed in troughs to reduce sagegrouse deaths.
- Twelve riparian buffer strips are being monitored.
- Baseline aquatic habitat conditions are being assessed in the lower Powder River drainage - a high priority native fish and amphibian watershed.

In addition, 4,950 acres have been treated with the Lawson Pasture Aerator (Figure 2). This implement aerates the clay-dominated soils and favors rizominous grasses, silver sagebrush, winter fat and fourwing saltbush. It also drops seed. The aerator is being used to enhance overflow and riparian sites for sagegrouse brood rearing. On these sites, dryland alfalfas and other forbs are being planted. The BLM purchased replacement drums and teeth for the Lawson aerator. Two sets of teeth have been worn off the aerator so far. The new teeth are eight inches and “hardened” (rather than 6 inches and not surfaced with hardened steel).



Figure 2. Almost 5,000 acres were treated with the Lawson Pasture Aerator. This implement aerates the clay-dominated soils and favors rizominous grasses, silver sagebrush, winter fat and fourwing saltbush. It can also drop seed.

The aerator is also used to reclaim go-back lands (previously farmed) to restore the structure and productivity of these lands for livestock, mule deer and antelope. In addition to interseeding forbs (Figure 3) and select grasses, we’re also planting fourwing saltbush to improve the structure of rangelands and browse for wild ungulates. By improving herbaceous production and maintaining conservative livestock stocking rates, we expect to reserve more forage and cover for wildlife. These changes are also expected to improve nesting habitat for sagegrouse.



Figure 3. Falcata alfalfa (shown above) and other dryland alfalfas have been used on most sites treated by the aerator. These forbs are expected to enhance brood rearing habitats for grouse.

Phase two involves another seven landowners comprising an additional 91,160 acres (for a total of 234,661 acres). The ranch conservation plans have been initiated and we’re beginning to seek funding for their implementation. Presently, the NRCS/LDCD has received applications for another six ranches that control more than 90,000 acres of sagebrush/grassland communities. If all are approved, the total project area will exceed 320,000 acres, a huge geographic area!

The foundation of this program is to use the Deseret Land & Livestock and Parker Mountain studies to achieve enhanced benefits for livestock and wildlife. The papers *Sage-Grouse Ecology and Management in Northern Utah Sagebrush-Steppe*, a *Deseret Land and Livestock Wildlife Research Report, 2002* by R. E. Danvir, and the *Parker Mountain Adaptive Resource Management Plan*

- 155 beaver have been transplanted since 2000 in a collaborative effort to restore declining populations of this keystone riparian species.
- Restoring stream stability and fish passage is being addressed through irrigation diversion rehab projects in the Clear Creek watershed while a cooperative effort to assess fish passage through the similar restored structures continues.
- Stream restoration structures in Clear Creek through Buffalo add interest to this urban fishery.
- Monitoring of E-coli concentrations in the North Tongue River and identifying cause and effect continues.

provide documentation of benefits to sagegrouse and other sagebrush obligates, as well as mule deer, pronghorn antelope and other wildlife from their ranch management operations. Increases in wildlife populations associated with sagebrush/grassland communities have been documented and are the result of their innovative ranch conservation technologies and approaches. These include, timed livestock grazing, forb plantings and mechanical and fire treatments. Due to Deseret’s success at increasing wildlife populations while maintaining a working ranch, the LDCD and collaborators initiated this program to replicate and test this “win-win” management model on private and public lands in northern Johnson County.

Specific objectives of the program include:

- Implementing and testing methods to rapidly produce inventories and information for livestock producers. From this, producers and collaborators can develop land management plans that benefit livestock, sagegrouse and other wildlife. All resource information, including soil, range, wildlife distribution, improvements and water inventories will be managed in a GIS database to supply a rapid decision-making tool for producers. A Wyoming NRCS conservation incentive program called the Grazing Lands Initiative is the basis of this work.
- Replicating and testing Deseret Ranch and Parker Mountain conservation technologies and approaches within a different set of environmental conditions. Promising ranch conservation technologies and approaches will be promoted by providing education opportunities to gain broad-based support throughout the Powder River Basin and the Conservation Districts within it. Best management practices for sagebrush obligates will also be developed and evaluated.
- Monitoring and quantifying improvements to rangeland production and biodiversity that result from improved grazing systems, mechanical treatments and forb plantings. The WGFD will quantify changes in sage-grouse populations by comparing male grouse attendance at leks within and outside the program area.

The Federal government has contributed considerable funding for this restoration effort. So far, the total exceeds \$1.76 million. The bulk of these funds need a non-federal match. Although livestock producers will shoulder much of this match (\$281,073 so far), conservation practices having specific benefits for sagegrouse need “outside” matching dollars to make this work. To date, producers, state agencies, non-government organizations, and industry have provided \$607,785 to match these federal dollars, most of which have 50/50 to 75/50 match ratios. See Table 1 for the list of contributors and the dollars they granted.

Table 1. Contributors to the LDCD’s sagebrush/grassland restoration effort (as of 12/31/06).

NRCS (Wyoming) EQIP, WHIP, etc.	\$1,425,136.00
NRCS (National) Conservation Innovation Grant	\$240,500.00
US Fish and Wildlife Service, Private Lands Program	\$40,000.00
BLM	\$64,278.00
Private Landowners Enrolled in Program	\$281,073.00
Oil and Gas Industry (Anadarko Petroleum, Lance O&G, Kennedy Oil).	\$75,762.00
Wyo. Governor's Sage-Grouse Fund- Northeast Wyo. Sage-Grouse Local Working Group.	\$90,000.00
Wyoming Wildlife and Natural Resource Trust Account	\$60,000.00
Wyoming Game and Fish Department	\$47,950.00
Sheridan/Johnson County Chapter of Pheasants Forever	\$15,000.00
Wyoming Governor's Big Game License Coalition	\$10,000.00
Eyas Foundation	\$10,000.00
Lake DeSmet Conservation District- Science Summit workshops	\$10,000.00
Wyoming Private Lands Grazing Team	\$3,000.00
Bighorn Environmental Consultants	\$3,000.00
Water for Wildlife Foundation	\$2,000.00
GRAND TOTAL	\$2,377,699.00



Figure 4. Escape ramps are being installed in troughs to reduce sagegrouse deaths due to drowning. Note the dead sagegrouse behind the pickup truck that were pulled from the tank.

Other achievements this year include the purchase of 100 escape ramps for small animals, which will be placed in existing and newly developed water troughs (Figure 4). The cost of these pre-fabricated ramps was split between The One-Shot Antelope Hunt Foundation's Water for Wildlife Program and the WGFD. The goal is to reduce sagegrouse drowning mortalities (Figure 5). A side benefit will be improved water quality for large animals that use the facilities, such as livestock, pronghorn antelope and mule deer.



Figure 5. Sage Grouse watering from rubber-tire water trough (Photo courtesy of Tom Maechtle).

Interns with the NRCS and WGFD spent much of the summer mapping sage grouse habitats and determining the ecological condition of sagebrush communities (Figure 6). Sage grouse sign, such as pellets and nest locations were mapped to allow seasonal ranges to be determined. Data were installed in a GIS to produce inventories and information for livestock producers. From this, producers and collaborators can develop land management plans that benefit both livestock and sage grouse.



Figure 6. The NRCS and State of Wyoming have provided interns during the summer months to help collect data.

In order to map and delineate sage grouse winter habitats, a local sage grouse specialist and his trained dogs are hired to search enrolled properties. These English setters are trained to search large areas (Figure 7). Because they range long distances, the dogs are fitted with radio collars that transmit their location and activity, or lack there of. When it's determined that the setter is on point (no activity), triangulation is used to locate it. The consultant can then flush and classify the sage grouse.



Figure 7. A contractor uses specially trained dogs and transmitters to search large expanses of sage grouse habitat. This information is used to delineate and map important winter habitats.

These locations are collected by a global positioning system (GPS) and installed in a geographic information system (GIS). At that time, the sagebrush patch is searched and sage grouse pellets are examined to verify the level and season of use (pellets containing mostly sagebrush are from wintering sage grouse). These efforts are needed because sage grouse have specialized habitat requirements (e.g., nesting cover, brood-rearing cover, winter cover, etc.) that should be taken into consideration when planning grazing systems and mechanical treatments. For instance, sage grouse will select different habitats based on sagebrush canopy cover, plant diversity and forb abundance. Although it's not practical to measure and map all enrolled lands, it is possible to collect these data within occupied grouse habitats. It's expected that the birddog survey technique will help provide this information.

MONITORING PRAIRIE STREAM RIPARIAN BUFFER STRIPS

Twelve riparian buffer strips are being monitored via “before and after” images in Sheridan and Johnson Counties. These projects are the result of the NRCS, Conservation Districts and WGFD working with landowners to enroll riparian habitats in the Farm Service Agency's Conservation Reserve Program. Many of these projects are half way through their 15-year exclusion of livestock. Phenomenal changes have occurred (Figure 8-11). Because the pictures communicate an important message concerning the importance of managing livestock in riparian areas, we are preparing a report that can be posted on the WGFD web site. We are also developing an MS PowerPoint presentation that can be shown at workshops, public affairs and conferences. Computer technology is being used to rectify the images so the “before and after” images are almost perfectly aligned. This eliminates any shifting of the image while viewing. Monitoring riparian buffer strips in the prairie ecosystem have taught us that any exposed point-bars are generally the result of inappropriate livestock grazing. Once rested from livestock grazing, plants invade and occupy every hydrologic condition, thus protecting and holding the soil profile.



Figure 8. These pictures were taken on Clear Creek, near Clearmont. The 2001 “before” picture is on the left-hand side. This year’s photo demonstrates how vegetation is becoming established on the point bars. In addition, leafy spurge (yellow flowered plant) has almost been eliminated. No chemicals have been sprayed to control this invasive species. This is entirely the result of the rancher releasing and distributing flea beetles, a biological control agent.



Figure 9. These pictures were taken on Columbus Creek, near Dayton. They demonstrate the effects of drought on riparian trees and shrubs. The picture to the left was taken in 2000, the first year of the current drought. The picture to its right was taken on the same day, six years later. Close inspection shows substantial reductions in shrub and tree canopy closure. Entire shrub patches have died and many of the boxelder trees have become decadent. We found that most of the riparian buffer strips being monitored are equally drought stressed.



Figure 10. These two pictures on Muddy Creek show what excluding livestock and restoring a stream to its original channel can accomplish.... and yes it’s the same spot. In six years, the 13-foot down-cut stream channel has been healed. This project was a collaborative effort between the NRCS, Lake DeSmet Conservation District and WGFD. Basin wildrye is now providing eyeball-level cover for wildlife.



Figure 11. These pictures were taken on Clear Creek near Buffalo. The picture on the left was taken in 2000, the first year of the drought. The picture to its right was taken on the same date, six years later. Even the cut-bank on the outside of the oxbow has stabilized.

Kendrick Dam Fish Passage and Screening Project

Negotiations continued with the Pee Gee Ranch relative to advancing the Kendrick Dam fish passage and screening project to a final design and implementation phase (Figure 12). Current plans entail negotiating a water management and maintenance agreement that satisfies the operational and maintenance requirements of the ranch. If acceptable to the ranch, the Department will then secure engineering assistance to develop final designs and consult with the ranch to determine if the designs meet the requirements that the proposed passage and screening infrastructure not impede diversion operations.

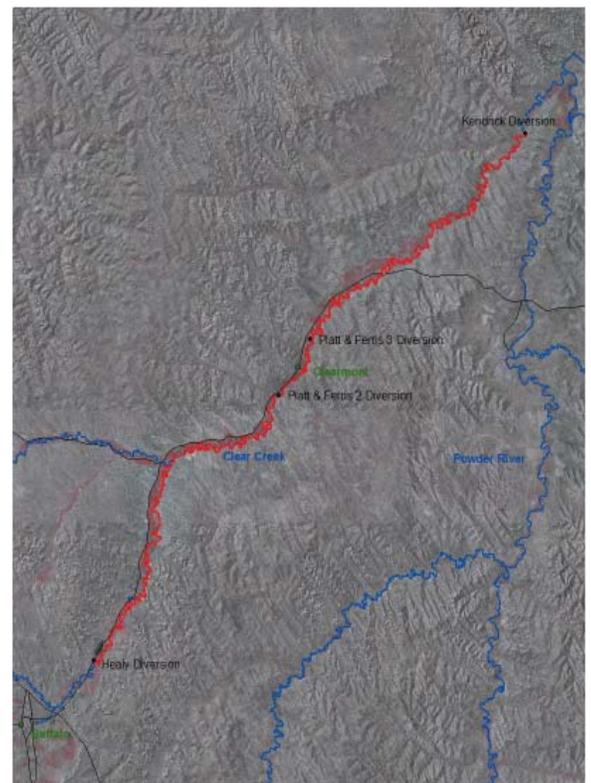


Figure 12. Fish passage at Kendrick Dam would open access to stream habitats for seven native fishes including sauger that are currently isolated below the dam. Up to 81-miles of Clear Creek (segment outlined in red) could be made available as habitat. The next irrigation occurs about 36-miles upstream of Kendrick Dam.

Substantial funding was previously secured from the United States Fish and Wildlife Services (USFWS) fisheries program for the project. The funding agreement was considered inactive, because no expenditures had been charged to the agreement. The USFWS Yellowstone River Coordinator requested an expenditure be incurred against the agreement or it would not be possible to extend the agreement beyond the initial agreement length. In turn, a portion of the available funds was used to help implement a screening project at Beck Lake near Cody. The Cody Aquatic Habitat Biologist oversaw the project and funding arrangements. This activity provided the opportunity to extend the available funding another two years.



Figure 13. Collecting wetted width, depth, substrate size, and habitat type information at one of 30- transects completed at the below Clear Creek study reach of the Powder River.

Powder River Baseline Habitat Surveys

Mapping Surveys: In 2005, fisheries and aquatic habitat personnel collaborated with United States Geological Survey personnel to map aquatic habitats along 10 2-mile long study reaches on the Powder River and Crazy Woman Creek using global positioning systems (GPS). The intent was to estimate the proportions and distribution of habitat units over a range of flows. In 2006, the GPS mapping protocol was dropped and a transect based approach modeled after the Environmental Protection Agency’s Environmental Monitoring and Assessment Program protocol was adopted to reduce the effort required to monitor habitat availability at the established reaches and gain a more repeatable protocol. About 30 transects were established at each study reach. Wetted width, depth, and substrate size was measured, and habitat type was observed at systematically sampled points along each transect (Figure 13). A detailed report on the 2005 and 2006 assessments are on file at the Sheridan Regional office.

Geomorphic Surveys: Geomorphic assessments, which included riffle cross-sections, longitudinal profiles, and pebble counts, were completed at the Above Pumpkin Creek reach of the Powder River to quantify the baseline condition (Figure 14). This complemented the geomorphic assessments completed at the Below Clear Creek and Above Clear Creek reaches of the Powder River in 2004, and the Lower Crazy Woman Creek reach in 2005. The goal of these assessments was to provide a comparison condition for future monitoring efforts. Summaries of these assessments are on file at the Sheridan Regional office.



Figure 14. The riffle cross section transect at the Above Pumpkin Creek study reach of the Powder River. Assessments occurred when no surface flow occurred in the river.

Lower Clear Creek Culvert Removal

Hydraulic characteristics at a new culvert crossing on lower Clear Creek were assessed near the confluence with the Powder River that was impeding the migrations of sauger, channel catfish, goldeye, and other game and nongame fish. Subsequently, the culvert was removed and future passage restored.

Powder River Tamarisk Mapping Proposal

A research proposal was developed to map tamarisk along the floodplains of the Powder River and selected tributaries. An objective of the research is to assess if, and by how much tamarisk may proliferate with the discharge of CBM-produced water in ephemeral tributaries.

North Tongue River Watershed Plan Development

The interagency working group continued efforts to develop a watershed management plan addressing the E-coli-impaired segment of the North Tongue River on the Bighorn National Forest. The affected grazing permittees requested a technical review team (TRT) review the current management situations in two of the North Tongue grazing allotments. The TRT was very complimentary of ongoing grazing management efforts by the Forest and permittees. Most recommendations involved applying grazing management infrastructure improvements and some prescribed burns that are already being considered by the Forest, applying greater flexibility in how the permittees are allowed to graze the allotments provided the existing standards can be maintained, and applying some additional process to gain clear and broad acceptance of the E-coli sampling protocol. Also, the TRT questioned the relevance of applying the primary contact standards to a high elevation, cold water stream where fishing is the primary recreational use (Figure 15).



Figure 15. Photograph of the North Tongue River, which depicts the general character of stream and riparian habitats common within the E-coli impaired segment of river.

Monitoring completed by the Forest in 2006 again identified E-coli concentrations in the North Tongue River were above the primary contact standard when domestic sheep were present along ridge tops and cattle were present within valley areas. The apparent correlation between observed E-coli concentrations and the intensity of livestock grazing use broke down. E-coli concentrations spiked while actual stocking rates were the lightest of the 3-year data record. However, a correlation with the presence or absence of livestock, though perhaps weakened, appears to persist. None-the-less, other unidentified factors may be contributing to the situation. The Forest plans to expand sampling efforts in 2007 to help identify unknown factors. The interagency working group will continue meeting periodically until a watershed management plan capable of resolving the impairment situation is complete.

Willow And Aspen Retention On The Bighorn National Forest Using Transplanted Beaver



Figure 16. 155 beaver have been transplanted to habitats on the Bighorn National Forest. This picture shows a moose watering in a beaver pond on Prospect Creek, the result of our 2004 transplant efforts.

The WGF D has conducted seven beaver cache surveys on the Bighorn National Forest (BNF) since 1986. These data indicate that beaver populations on the BNF are declining. Drainages that contain beaver generally have lower populations today, while many previously occupied habitats are no longer populated. The most recent survey failed to detect evidence of beaver activity in ten sixth-order watersheds, which were historically occupied.

In response to declining populations and the absence of this keystone species in some drainages, the WGF D and BNF have collaborated with the RMEF, Wyoming Governor's Big Game License Coalition and Bow Hunters of Wyoming to provide a continuous stream of funds for transplanting beaver to previously occupied habitats. Habitats have been prioritized based on patch size and connectivity of willow and aspen resources, as well as historic activity, hydrology and suitable habitat conditions. Based on our analysis,

we recommended that beaver be transplanted to at least fourteen sites. More should be considered once these habitats are occupied. Since the year 2000, 155 beaver have been transplanted. Twenty-one of those were released this year in the Muddy Creek watershed, just off State Highway 16 (Figure 16).

Another retention project involves the BNF's efforts to remove conifers from aspen patches to stimulate re-sprouting and more vigorous growth. This year, 220 acres were treated.

USFS Bighorn National Forest Mule Deer And Elk Transition Habitat Enhancement Projects

The USFS Bighorn National Forest continues to support the WGFD's objective of enhancing transition range habitats for mule deer along the east slope of the Big Horn Mountains. The Forest burned 390 acres of grass and ponderosa pine communities last spring to invigorate forage for big game (Figure 17). Fire causes plants to green-up earlier during a time period when animals are desperately trying to regain their winter weight loss. This weight gain boosts milk production for offspring, thus resulting in heavier and healthier fawns and calves. When big game return to these transition habitats during the late-fall months, improved conditions allow the males to recover from the rut and females to recuperate after weaning their young.



Figure 17. Bighorn National Forest personnel burned 390 acres of mule deer and elk transition habitats last spring. These burns also reduce hazardous fuels and the intensity of wildfires.

Beaver Dam Creek Watershed Beaver Transplants

A contract trapper began efforts to live trap beaver in June, but was unable to find evidence of recent beaver activity on ranches he had trapped in previous years. Landowners were contacted that had previously reported beaver concerns to the Sundance Game Warden. Only one of the contacts seemed promising. All other landowners reported their beaver damage concerns had previously been controlled either through recent trapping, dewatering due to drought, or the suspected occurrence of tularemia. Follow-up assessment of the promising site by the contract trapper found it to be depleted of beaver. In turn, live-trapping efforts were suspended in August due to our inability to obtain beaver for transplant stock.

Bighorn National Forest Stream Rehabilitation Projects

Boy Scout Reach of the South Tongue River

A Bighorn National Forest sponsored cost-share proposal was unsuccessful in 2006. The proposal sought funding from the Department's wildlife trust fund for the proposed stream rehabilitation project at the Boy Scout reach of the South Tongue River (Figure 18). The project was resubmitted for wildlife trust fund funding consideration in 2007. Initial funding recommendations appear more favorable for providing cost-share assistance to the project in 2007.

Dead Swede Reach of the South Tongue River: Photographs originally taken in 2003 at the Bighorn National Forest's Dead Swede rehabilitation reach were retaken in 2006. The project was originally undertaken to narrow the over-widened channel, expand a tight, eroding meander bend, stabilize eroding stream banks, and enhance fisheries habitat. All flow-retard structures, which were intended to reduce erosive forces on banks, appeared to be functioning as intended. Monitoring will be necessary to determine if any structures continue adjusting, and, in turn, widen the stream beyond desired conditions. Stream width,

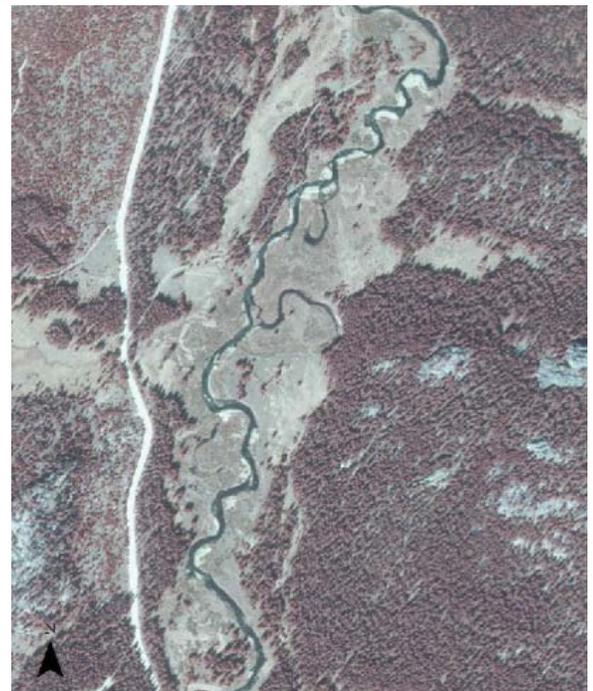


Figure 18. Aerial overview of the South Tongue River depicting the stream reach proposed for rehabilitation efforts during the Boy Scout stream rehabilitation project.

depth, depositional processes, and geometry within the rehabilitated reach appeared to remain within the natural range of variability for the watershed. Some lateral erosion was apparent at the realigned oxbow (Figure 19). Additional monitoring will be necessary to determine if the bank adjustment processes progress further, or if adequate root mass develops to impede the adjustment process. The relatively steep slopes of the banks may limit vegetation development. It is also possible the meander radius could widen, which may lead to increased bank stability.



Figure 19. Bank conditions at a segment of the realigned oxbow bend at the Dead Swede rehabilitation reach on the South Tongue River. The photo on left was taken shortly after realignment in 2003 and on right in 2006.

Upper North Tongue Stream Improvement: In 2006, some stream adjustment occurred in a cooperative stream improvement project reach on the North Tongue River the Department and Bighorn National Forest completed in 1983. An avulsion created a new channel segment along an area that was previously floodplain (Figure 20). The abandoned channel contained several plunge pool structures. Initial coordination with Forest personnel indicated additional monitoring would be desirable to assess if the adjustment warrants corrective measures since streams adjust naturally. Some adjustment is necessary to rejuvenate some riparian plants and sustain healthy and diverse riparian habitats over time. Hence, no immediate plans exist to rehabilitate the avulsion. Rather, the Department will work with the Forest to determine if removing the abandoned structures or other rehabilitation efforts (e.g., placing grade control in the new channel) will be necessary.



Figure 20. The new channel created by an avulsion in a segment of the upper North Tongue stream improvement project reach. The abandoned channel appears in front of the new channel.

Welch Ranch (Interstate) Diversion on the Tongue River

Discussions were initiated with representatives of the Interstate Ditch Company relative to pursuing a fish passage project at the Interstate Diversion Dam on the Welch Ranch property. The president of the ditch company was receptive to investigating a passage project provided the Department could protect all members' interests in the diversion. Other members appeared more reluctant. More trust building will be necessary.

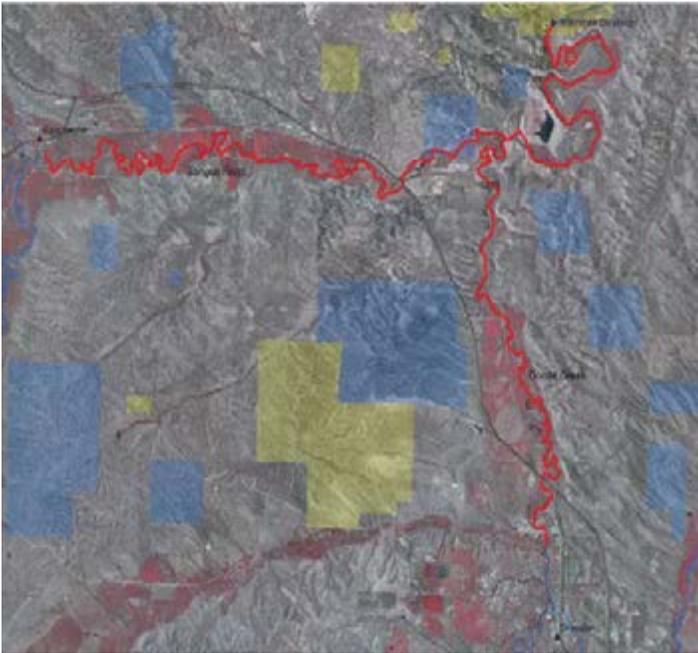


Figure 21. Portions of the stream segments on the Tongue River and Goose Creek depicted in red could be made available to sauger and channel catfish by implementing a passage project at the Interstate Diversion Dam.

Questioning persists among fisheries personnel relative to establishing fish passage at the dam. Conceptually, 26-miles of the Tongue River (to Ranchester) and 12-miles of Goose Creek (to Sheridan) could be made available above the dam for use by migratory sauger, channel catfish, and perhaps other species (Figure 21). But, it is unknown how much of the 38 total miles of stream may provide suitable habitat for these species. Further, the current situation may isolate a resident sauger population above the dam from walleye or potentially walleye-introgressed sauger populations within the lower Tongue River and Tongue River Reservoir. Establishing passage to upper segments of the Tongue River may not be prudent if the potential for competition or hybridization increases. Although no sauger were found above the dam during minimal sampling efforts in 2006, it is conceivable some sauger may pass the dam during some flow conditions. Additional surveys will occur in the future to assess the status of existing sauger and walleye populations above and below the dam and the timing of spawning.

Sage Grouse Winter Habitat Selection And Coal Bed Natural Gas Development

Assistance was provided to University of Montana researchers, Dr. Dave Naugle, Kevin Doherty and Brett Walker, to spatially depict sage grouse winter habitat suitability in a GIS format to assess if these habitats are limited. The researchers also generated a robust statistical model for sage grouse winter habitat selection while determining the importance of scale; and assessed if sage grouse winter habitat selection is being effected by the introduction of coal-bed natural gas (CBNG) development.

In a paper produced by the researchers, they justified the research because relatively little emphasis has been placed on wintering habitat selection for sage grouse. Many studies have shown sage grouse to have high over-winter survival rates, thus assumptions were made that wintering habitat was not limiting. However, recent land use change in the form of CBNG gas has caused drastic changes to sagebrush habitats within the Powder River Basin, thus prompting the study into sage grouse wintering habitat use.

Preliminary results show that a large portion of the Powder River Basin has a low probability of use for wintering sage grouse, thus the area of suitable wintering habitat may be limiting to sage grouse (Figure 22). Habitat analysis also showed that sage grouse wintering areas are currently undeveloped by CBNG. Given that high quality wintering habitats are a small proportion of the total landscape and that many of these areas are in direct proximity to CBNG development, the researchers recommended that land managers should exercise caution in development until effects of CBNG on winter habitat use are understood. Assistance was also provided to the researchers in ground-validating a land cover/habitat map (used in the above model) derived from SPOT satellite sensors.



Figure 22. University of Montana researchers have shown that a large portion of the Powder River Basin has a low probability of use for wintering sage grouse, thus the area of suitable wintering habitat may be limiting to sage grouse.

A presentation was given to participants of the Lake DeSmet Conservation District's Science Summit. This year the theme of the conference focused on what local communities can do to preserve and enhance sage grouse habitats.

Burnt Hollow Management Area Sagebrush And Club Moss Treatment

The WGFD provided their Dixie harrow to the BLM to treat sagebrush and club moss-dominated rangelands on their Burnt Hollow Management Area (BHMA). The BHMA is located in Campbell County about 17 miles north of Gillette. Approximately 150 acres were treated with the objective of improving rangeland conditions while reducing fuels (Figure 23). The mechanical treatment was also used to create fuel breaks at the perimeter and within selected sagebrush stands to reduce the potential for catastrophic loss from wild land fires.



Figure 23. The Dixie harrow was used to reduce the canopy cover of club moss (shown above) to increase herbaceous production and create opportunity for sagebrush seedling establishment. The club moss mat seals the soil surface and inhibits perennial vegetation establishment and production.

Shrub Monitoring In The WGFD Sheridan Region

Shrub monitoring was initiated in the Sheridan Region in 2004 so district biologists and wardens could collect baseline habitat trend data to monitor “key” or “indicator” areas that appear to reflect what’s occurring within the larger area and where the vegetation community may show reactions or changes to population management. These data are used to justify season recommendations and population objectives.

Nine Wyoming big sagebrush transects and one curl-leaf mountain mahogany transect were established (Figure 24). In addition, 10 willow transects are monitored by the U.S. Forest Service on the BNF with occasional assistance from WGFD district and habitat biologists.

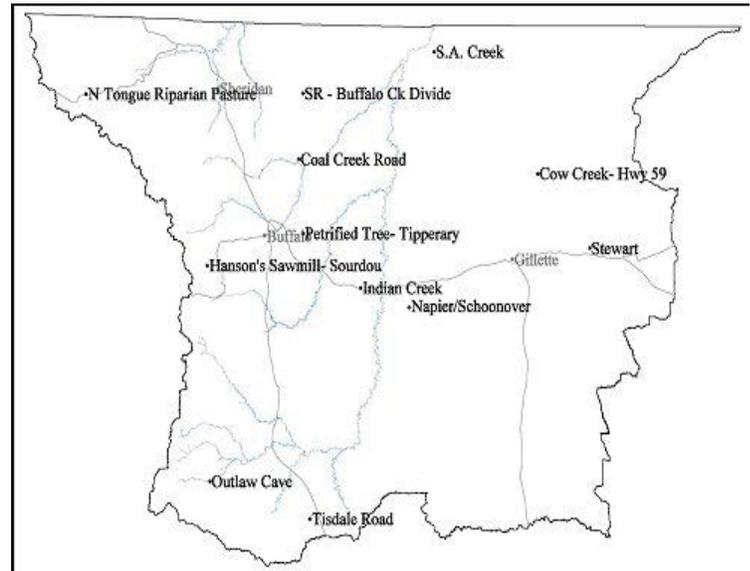


Figure 24. Location of Sheridan Region 2004-05 Shrub Transects.

Results of big sagebrush monitoring in 2006 (Table 2) shows that leader production averaged 2.22 cm (range 1.77 – 2.71 cm). While production was much better than the drought year 2004 (average of 0.50 cm), production fell well short of the 2005 average of 6.35 cm... a year when significant moisture fell during the early growing season.

Table 2. Sheridan Shrub Transect Summaries

<i>Transect</i>	<i>Production Year</i>	<i>Shrub Species</i>	<i>Average Leader Production (cm)</i>	<i>Average Leader Production (in)</i>	<i>Average Percent Leaders Browsed</i>	<i>Average Stand Age</i>	<i>Average Hedging Score</i>
Coal Creek	2004	Wyoming Big Sagebrush	1.17	0.46	2.0	2.92	1.02
Coal Creek	2005	Wyoming Big Sagebrush	6.99	2.75	1.0		1.76
Coal Creek	2006	Wyoming Big Sagebrush	2.13	0.84		2.30	1.92
Cow Creek	2004	Wyoming Big Sagebrush	0.20	0.08	2.0	2.42	2.00
Cow Creek	2005	Wyoming Big Sagebrush	3.29	1.29	1.0		1.51
Cow Creek	2006	Wyoming Big Sagebrush	3.11	1.23		2.04	1.24
Indian Creek	2004	Wyoming Big Sagebrush	0.03	0.01	0.0	2.10	1.00
Indian Creek	2005	Wyoming Big Sagebrush	19.66	7.74	5.0		
Indian Creek	2006	Wyoming Big Sagebrush	1.77	0.70			1.76
Napier/Schoonover	2004	Wyoming Big Sagebrush	0.38	0.15	11.0	2.70	2.00
Napier/Schoonover	2005	Wyoming Big Sagebrush	3.53	1.39	17.0	2.15	1.76
Outlaw Cave	2004	Curleaf Mountain Mahogany	0.55	0.22	5.0	2.11	2.06
Outlaw Cave	2006	Curleaf Mountain Mahogany	1.54	0.60		2.16	2.04
SA Creek	2004	Wyoming Big Sagebrush	0.36	0.14	0.0	2.77	2.00
SA Creek	2005	Wyoming Big Sagebrush	3.83	1.51	3.0		
SR-Bufferlo Divide	2004	Wyoming Big Sagebrush	0.68	0.27	4.0	2.40	1.00
SR-Bufferlo Divide	2005	Wyoming Big Sagebrush	3.71	1.46	9.0	1.94	1.62
SR-Bufferlo Divide	2006	Wyoming Big Sagebrush	2.71	1.07		2.24	1.74
Stewart	2004	Wyoming Big Sagebrush	0.48	0.19	20.0	2.29	2.04
Stewart	2005	Wyoming Big Sagebrush	3.44	1.36	15.0		1.59
Stewart	2006	Wyoming Big Sagebrush	1.87	0.74			
Tisdale	2004	Wyoming Big Sagebrush	0.70	0.28	9.0	2.77	2.12
Tisdale	2006	Wyoming Big Sagebrush	1.78	0.70			2.38

Age Class
 1 = young
 2 = mature
 3 = decadent
 4 = dead

Hedging Class
 1 = light or no hedging.
 2 = moderate hedging.
 3 = heavy hedging.

Data indicates that these stands of sagebrush are mature and receive light use by big game (average of 6.6 percent with a range between 0 – 20 percent of the leaders browsed). One curl-leaf mountain mahogany stand is monitored near Outlaw Cave on the Middle Fork Powder River west of Kaycee. Monitoring indicated that average leader production was 1.54 cm, reflecting similar effects of moisture on the plant’s growth potential.

Pellet group counts in 2005 (Table 3) complemented utilization data showing similar results that supported light use in all transect areas. Pellet groups attributed to wildlife included mule deer, pronghorn and sage grouse. Livestock groups were limited to cattle. Overall, the data demonstrates there are no overuse issues associated with big game (at least where transects were established) and that big game hunting seasons should not be influenced by these results.

Table 3. Pellet Group Count Summaries

<i>Transect ID</i>	<i>Date</i>	<i>Species</i>	<i>Average Pellet Groups per Acre</i>
Coal Creek	4/25/2005	DEER, MULE	60
	4/26/2005	COW, DOMESTIC	100
	5/ 2/2006	COW, DOMESTIC	240
	5/ 2/2006	DEER, MULE	10
	5/ 2/2006	PRONGHORN	30
Cow Creek	4/26/2005	COW, DOMESTIC	80
	5/12/2006	COW, DOMESTIC	40
Indian Creek	4/19/2005	PRONGHORN	10
	5/17/2006	DEER, MULE	40
	5/17/2006	PRONGHORN	40
Napier/Schoonover	5/17/2006	sage grouse	
	3/ 5/2005	COW, DOMESTIC	90
	5/ 3/2005	DEER, MULE	80
	5/11/2006	COW, DOMESTIC	260
	5/11/2006	DEER, MULE	160
Outlaw Cave	5/11/2006	PRONGHORN	40
	4/18/2005	COW, DOMESTIC	30
	4/18/2005	DEER, MULE	80
Petrified Tree	5/18/2006	DEER, MULE	240
	4/19/2005	COW, DOMESTIC	100
	4/19/2005	DEER, MULE	70
	5/ 2/2006	COW, DOMESTIC	30
	5/ 2/2006	PRONGHORN	40
SA Creek	5/ 2/2006	RABBIT	60
	5/ 3/2005	COW, DOMESTIC	80
	5/19/2006	COW, DOMESTIC	70
	5/19/2006	DEER, MULE	10
SR-Buffer Divide	5/19/2006	ELK	0
	4/25/2005	COW, DOMESTIC	30
	4/25/2005	DEER, MULE	80
Stewart	5/ 2/2006	DEER, MULE	10
	5/ 2/2006	PRONGHORN	140
	5/ 2/2006	RABBIT	20
	4/25/2005	COW, DOMESTIC	30
	4/25/2005	PRONGHORN	60
Tisdale	5/12/2006	COW, DOMESTIC	60
	5/12/2006	DEER, MULE	160
	4/18/2005	COW, DOMESTIC	50
	4/18/2005	GROUSE, SAGE	40
Tisdale	4/18/2005	PRONGHORN	50
	5/17/2006	DEER, MULE	100
	5/17/2006	PRONGHORN	100

HABITAT EXTENSION SERVICES

This year, 17 landholders and consultants (that work with private landholders) were assisted with their wildlife habitat enhancement and protection projects. These included helping ranchers mitigate the detrimental effects of coal-bed natural gas development and making reclamation recommendations such as seed mixes, livestock grazing strategies for enhancing wildlife habitats, pheasant management plans and food plot establishment, and seed mix recommendations for wildlife habitat enhancement. Specific projects include:

Falxa Ranch Management Planning And Prescribe Burns

The Falxa Ranch, WGFD, NRCS and Rocky Mountain Elk Foundation (RMEF) are cooperatively developing plans and funding habitat enhancement projects on the 2,139-acre mountain property of the Falxa Ranch. So far the group has cross-fenced the property to create three separate pastures. This enabled the owner to establish a three-pasture rotation, where he strives to achieve positive Grazing Response Index (GRI) values. The GRI was developed by the Colorado State University Range Extension Program to achieve the recovery of plants after grazing. Previously, summer-long grazing practices had allowed mountain big sagebrush to dominate the site (crown closures of approximately 30-40%), thus restricting grass/forb abundance and diversity. Current grazing management has improved rangeland conditions and enhanced riparian and wet meadow habitats.

In May of 2001 (after the grazing program was in place), the RMEF and WGFD funded a prescribed burn within one of the three pastures, with the objective of burning a different pasture every 5-7 years. This summer the burned pasture was examined with Rick Pallister, the RMEF's Wyoming Field Director, to determine if the area is ready for additional burns. As shown in Figure 25, mountain big sagebrush plants have re-occupied the site. We also found that forb diversity greatly exceeds adjacent un-treated sites. We are now ready to treat the second pasture. Grant proposals were submitted to the RMEF and Wyoming Governor's Big Game License Coalition (WGBGLC) to fund this second phase.



Figure 25. This picture shows how previous burns are recovering. After just five years, mountain big sagebrush plants are re-occupying the site and forb diversity is much better than un-treated sites.

The Falxa mountain pasture is within 1/3 mile of crucial elk winter ranges and provides yearlong habitat for mule deer. The site also provides important brood-rearing habitat for migrant sagegrouse. Consequently, treatment prescriptions will be carefully designed and tailored to these species. The objective is to open small patches within the sagebrush-dominated landscape by creating a mosaic of early-seral conditions. Wildlife use, especially elk and deer have increased due to management changes and burning. The Falxa family also requires that the outfitter allow free access for cow elk hunting.

Habitat Extension Service Contacts and Technical Assistance

Technical assistance was requested from Natural Resource Conservation Service (NRCS) personnel on several projects. Three requests involved reviewing landowner-sponsored projects designed by NRCS, which, among other goals, were intended to provide fish passage at existing irrigation diversions. These included diversions on upper Prairie Dog, Stockade Beaver, and South Piney creeks. Also, the Buffalo NRCS requested information on aquatic resources and the Department's habitat priorities within the Clear Creek watershed for consideration during the development of a watershed assessment project.

A reservoir rehabilitation project proposed at the Hansen walk-in fishing area was postponed because the Weston County NRCS was unsuccessful in securing cost-share funding to match available Private Lands Public Wildlife program habitat funds. The NRCS will pursue funding again in 2007.

A project led by the Newcastle Wildlife Biologist and other interests was initiated to explore options to rehabilitate two reservoirs on upper Plumb Creek. Additional assistance with the preparation of cost-share funding proposals is anticipated in the future once rehabilitation plans are available.

Advice and informational materials were provided to three other landowners or managers regarding potential projects on Piney, Big Goose, and McCormick creeks. Follow-up requests for cost-share assistance are not expected due to the limited scale of their requests, or reluctance to provide opportunities for sportsperson benefits in return for cost-share assistance.

A tour was completed of segments of the Fiddleback allotment on the Thunder Basin National Grasslands with Casper habitat personnel, a Thunder Basin National Grasslands representative, and the allotment permittee. The intent was to discuss options for future habitat restoration efforts. Two restoration strategies – controlling cheat grass infestations and fencing riparian habitats to provide prescribed grazing management and gain passive restoration – appeared to warrant further investigation. Overcoming some grazing management challenges will be necessary before these restoration strategies can be pursued further.

Fish Passage at Low-Head Diversion Dams

A cooperative research project was initiated with the United States Bureau of Reclamation (USBR) and Natural Resources Conservation Service (NRCS) to assess passage by various fish species at some commonly constructed low head diversion dam designs. The goal was to develop guidance for diversion dam designs that accommodate both game and nongame fish movements past the dams. A stepped boulder structure at the Frank Hopkins diversion on Clear Creek (Figure 26), which was constructed recently to reduce the annual maintenance necessary of a former push-up dam, was selected for evaluation during the project. A stepped sheet-piling structure is also being assessed in the Green River region as part of the statewide project.



Figure 26. The stepped cross vane diversion structure at the Frank Hopkins diversion on Clear Creek.

Fish movement assessments using mark and recapture techniques were initiated in spring during the spawning migrations of various species to determine if fish were currently passing the stepped rock structure. Twelve species were captured above and below the structure. These assessments will be concluded in 2007.

In fall, USBR and NRCS personnel initiated a series of flow and topographic assessments at the structure. Additional surveys will be completed in 2007 at different flow conditions to calibrate hydraulic models of the structure. In turn, various design modifications will be tested in the laboratory to assess their effectiveness at allowing passage by various fish species over a range of flow conditions. In the end, guidelines will be developed and made available to landowners regarding options to rehabilitate small diversions that will meet their water delivery needs while accommodating the natural movement requirements of fish to spawn or seek thermal refuges during low flow conditions.

OUTLAW CAVE WILDFIRE EFFECTS ON CRUCIAL MULE DEER WINTER RANGES

Gretchen Meyer, Natural Resource Specialist with the BLM, analyzed Landsat satellite sensor data to delineate what had burned in the Outlaw Cave wildfire. WGFD personnel used these data to calculate what vegetation actually burned (using a Landsat-derived land cover map). Biologists were concerned that the wildfire had removed a substantial amount of curl-leaf mountain mahogany, a valuable winter-browse species.

We estimated the fire burned 11,574 acres, of which 815 acres were curl-leaf mountain mahogany within crucial mule deer winter ranges (Herd Unit 322). This amounted to a 7 percent loss during this single event (Figure 27). In 1996, we found mahogany to be crucial to mule deer within the Middle Fork Powder River area. While comprising only 5.4 percent of the landscape, curl-leaf mountain mahogany accounted for 75 percent of the discerned fragments from mule deer fecal samples. The density of mule deer pellet groups within this type affirmed this preference. Average pellet groups per acre approximated 427.0, for an average days use per acre of 32.8.



Figure 27. Over 7 percent of the curl-leaf mountain mahogany occurring on crucial mule deer winter ranges in Herd Unit 322 burned this summer. In some areas (as shown in this picture), it was entirely removed.

Lake DeSmet Conservation District Clear Creek Stream Rehabilitation Project

Cost share assistance was provided to the Lake DeSmet Conservation District to implement phase-2 of stream rehabilitation efforts on Clear Creek along the Buffalo pathway system. The work, which was completed by a contractor during the fall (Figure 28), included in-stream alterations to:

- increase pools
- stabilize point bars
- protect streambanks with flow-retarding structural configurations that direct shear forces away from banks
- increase floodplain connectivity with bankfull benches at strategic locations,
- narrow the channel
- restore bedload movement dynamics (e.g., focus flow to maintain sediment transport through pool habitats, increase substrate sorting to create potential spawning glides),
- concentrate flows in strategic locations to increase physical habitats available for trout during low flow periods (multistage channel)

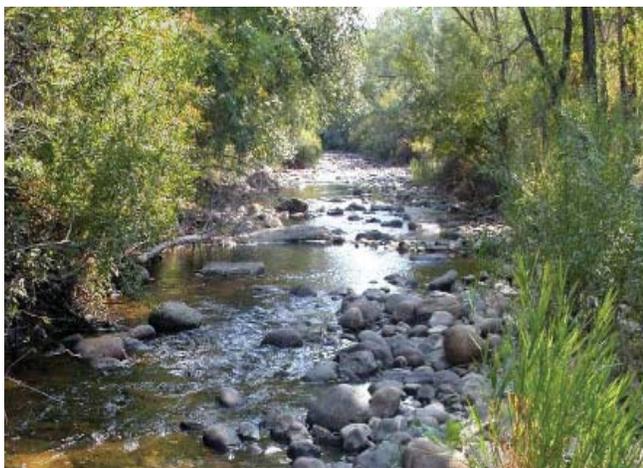


Figure 28. Clear Creek within the phase-2 stream rehabilitation reach before (left) and after (right) the implementation of rehabilitation work.

Other contributors included the Lake DeSmet Conservation District, who provided funding and in-kind cost-share contributions through funding administration, and the City of Buffalo, which contributed funding for contractual services and the boulders used to construct the flow-retard structures included in the project. Additional monitoring is being completed by the Department to assess the response of the fishery. These monitoring efforts will continue in 2007.

Lake DeSmet Conservation District Diversion Rehabilitation Project

Work was completed in fall to rehabilitate three diversion structures on Clear and Rock creeks near Buffalo (Figure 29). The Department provided cost-share assistance to implement the rehabilitation projects through a grant from the wildlife trust fund, and helped secure additional funding from the Wyoming Governor's Big Game License Coalition. Additional funding came from the Wildlife Habitat Incentive Program administered by the Natural Resources Conservation Service (NRCS) and the diversion operators. Rehabilitation entailed replacing push-up dams with a series of stepped, permanent structures considered to be less obstructive to the movements of aquatic species, and less detrimental to streambank stability at the diversion site. The Lake DeSmet Conservation District administered funding for the projects and the Buffalo NRCS led all landowner contacts associated with the efforts. A private contractor implemented the diversion rehabilitation projects. Through the demonstration value of the completed rehabilitation projects, the hope exists that additional landowners will participate in the program to alleviate the annual maintenance associated with push-up dams. The Department's objectives to restore fish passage and stream stability would be addressed concurrently.



Figure 29. The rehabilitated Clear Creek Land and Ditch Company diversion structure (top) and Redman diversion structure (middle) on Clear Creek, and the Prince Albert and Ono diversion structure (bottom) on Rock Creek.

Army National Guard Sheridan Local Training Area

Assistance was provided to Tim Thomas, the WGFD Sheridan District Biologist, with providing comments concerning the Army National Guard's Integrated Natural Resources Management Plan (INRMP) for the Sheridan Local Training Area (LTA).

Comments focused on our concerns about the environmental effects of inappropriate livestock grazing on the Sheridan LTA. In 1995, the NRCS conducted a range survey at the request of the grazing permittee. The survey results showed that 73 percent of the Sheridan training facility had a range condition of only "fair". Twenty-six percent of the area was in "poor" condition, while only 1 percent was determined to be in "good" condition. None of the range sites on the 3,960-acre Sheridan LTA were in "excellent" condition. In view of this, it's understandable why neighbors, some publics and natural resource agencies are disappointed with historic livestock management on this area (Figure 30).



Figure 30. This picture shows livestock overgrazing that's occurring adjacent to water sources on the Sheridan LTA.

We hope to work with the Army Guard to improve wildlife habitats and to enhance recreation opportunities on this WGFD Hunter Management Area. Dr. Roy Roath, a range extension specialist from Colorado State University, was given a tour of the area. Dr. Roath will be available to provide assistance with developing a grazing management program.

Black Hills National Forest - North Bear Lodge Watershed Inventory

Reconnaissance efforts were completed in the Deep, East, Pine, and Beaver Dam creek watersheds within the Bear Lodge Ranger District of the Black Hills National Forest to assess the suitability of riparian resources to support beaver populations. These efforts were shared with Bear Lodge Ranger District personnel to hasten the assessments. Four criteria were used to prioritize watersheds for beaver transplant consideration. These included relative availability of water (e.g., persistent flow, stream area), availability of suitable vegetation resources within or in close proximity to riparian zones, availability of potential refuges (e.g., existing ponds) that might facilitate beaver remaining in the watershed, and proximity of the suitable watershed segments to private lands where damage situations might develop. The Beaver Dam Creek watershed was ranked the highest priority for transplant consideration, followed by the upper reaches of the Pine Creek watershed (Figure 31). East and Deep creeks were found unsuitable for beaver transplants at this time due to limited woody riparian vegetation.

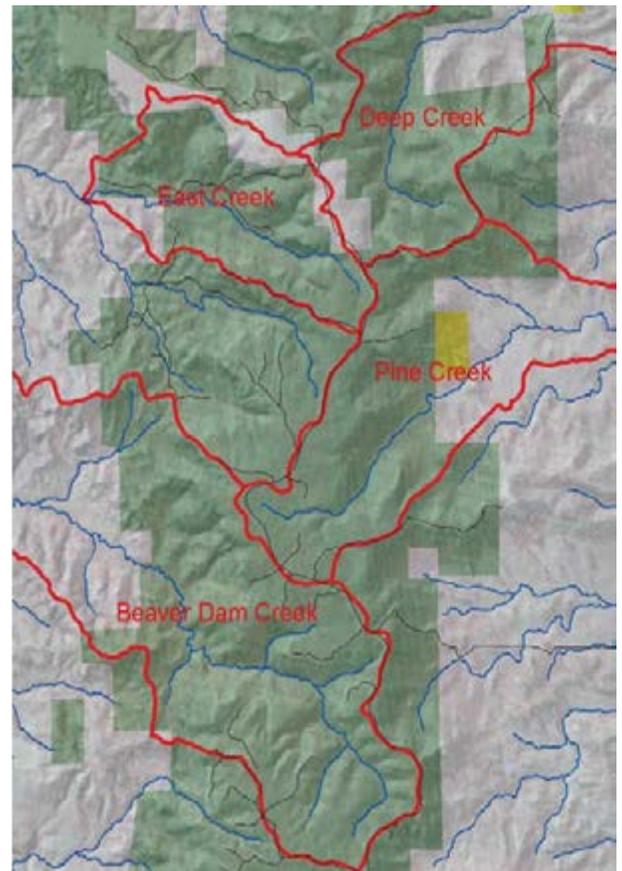


Figure 31. Location of watersheds considered for beaver transplant projects on the north end of the Bear Lodge Ranger District of the Black Hills National Forest.

BLM And WAFWA Livestock Grazing Bmp Technical Group Participation

The Western Association of Fish and Wildlife Agencies (WAFWA) requested development of Best Management Practices (BMPs) for livestock grazing in sagebrush steppe and other habitats used by sage grouse at the July 2004 WAFWA meeting. WAFWA's goal of developing livestock grazing BMPs was conveyed to the BLM at the 2004 WAFWA winter meeting. At approximately the same time (November 2004), the BLM issued its National Sage Grouse Habitat Conservation Strategy that included a specific action (Action 1.4.3) to "Develop and issue livestock grazing BMPs to restore, maintain and enhance the quality of sage grouse and sagebrush habitat."

The WAFWA and BLM decided to commence the development of BMPs by creating a technical committee of experts. They also decided that BMPs must consider local conditions and the Wyoming Basins ecoregion was selected as the pilot site. Considerable time was spent serving on this technical committee to develop a synthesis of literature to create science-based BMPs. The synthesis used the BLM National Science and Technology Center's literature review of livestock grazing impacts on sagebrush ecosystems. The resulting synthesis contained vegetation and grazing objectives grouped by seasonal habitat components for sagegrouse.

WILDLIFE HABITAT MANAGEMENT AREAS

Kerns, Amsden Creek, Bud Love and Ed O. Taylor WHMA's

A considerable number of habitat enhancement projects occurred on the WHMA's within the WGFD Sheridan Region.

The Habitat and Access Section used a range pitter to treat 300 acres on the Kerns WHMA (see Figure 32). This implement creates large divots that capture moisture and stimulates forage production by breaking up sod-bound grasses. The treatment occurred on the TR Bench portion of the habitat area, which is the preferred winter foraging area for 650 elk. This habitat area has always been precariously close to having inadequate food supplies.



Figure 32. Approximately 300 acres were treated with a range pitter on the Kerns WHMA.

Two hundred acres of grassland, ninebark and chokecherry shrubs were also burned on the Kerns WHMA. The fire treated an area directly above TR Bench. That same spring, 300 acres of grasslands were burned on the Bud Love WHMA, which winters approximately 500 elk (see Figure 33). The WGBGLC, RMEF and WGFD Trust Fund provided the dollars to hire a contractor to conduct the burns.



Figure 33. Over 300 acres were burned on the Bud Love WHMA in the spring of 2006.

Wildfires occurred on both the Kerns and Ed O. Taylor WHMAs this year. The man-caused fire on the Kerns WHMA had minor consequences and was quickly extinguished. Some damage occurred to a portion of the elk-fence however.

A lightning strike caused an 11,574-acre wildfire that started on the Ed O. Taylor WHMA (see Figure 27 and 34). This wildfire burned 2,980 acres of the 10,158-acre habitat area. Most of these acres had previously been prescribe-burned and/or burned in another wildfire, which have occurred since 1999.

Bow Hunters of Wyoming and the WGBGLC provided funding to purchase a solar array and pump to provide water to the southern portion of the Bud Love WHMA (see Figure 35). Mike Brogan from the Casper BLM office provided the technical assistance to our Habitat and Access Maintenance supervisor to install the unit. This well will intermittently produce one gallon per minute of water during the warmer months for deer, antelope and other wildlife.



Figure 35. A solar array and pump were installed on the Bud Love WHMA to provide water for mule deer, pronghorn antelope and other wildlife.

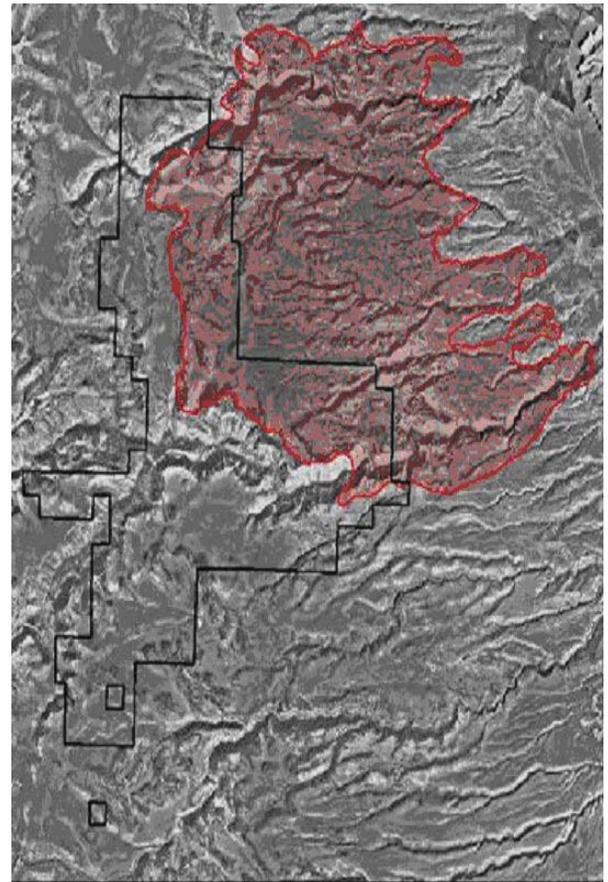


Figure 34. The 11,574-acre Outlaw Cave wildfire (shown in Red) burned 2,980 acres of the Ed O. Taylor WHMA (black polygon) this year.

Sand Creek Public Fishing Area Management

The Aquatic Habitat Biologist coordinated plans for livestock turn-in on the Sand Creek Access Area with the grazing lessee. Three hundred twenty pairs were grazed May 21 to June 2. Actual use was about 138 animal unit months (AUM) using a direct one pair per animal unit conversion. As per the request of Habitat and Access personnel, the rationale for the current grazing management regime was documented for the purpose of keeping records.

Reedem Report

A report was prepared and distributed that details the success of using the herbicide Reedem in controlling Canada thistle in cool-season grasses and riparian habitats. After removing thistle, native warm season grasses and forbs were capable of re-establishing.

WHAM Surveys

Completed WHAM level-1 assessments along the West Fork of the Little Bighorn River from the mouth to Deer Park, and along Wolf Creek above Wolf, WY while accompanying fisheries management personnel documenting potential natural barriers to the upstream movements of fish.