CASPER REGION

HABITAT PROJECTS

Bates Creek Watershed Restoration Project

The project was initiated in the spring of 2004 to set back succession in aspen communities allowing for recruitment of young plants, creating uneven-aged stands across the landscape, and improving hydrologic conditions within the Bates Creek watershed.

Figure 1. Spring 2005 aspen prescribed burn.

Figure 2. Fall 2005 aspen prescribed burn.

Figure 3. Aspen regeneration following spring prescribed burn.

To date, we have cut and prescribed burned 162 acres of aspen, and prescribed burned 550 acres of big sagebrush at a cost of approximately $157 per acre (Figures 1 and 2). This project was one of two that has been submitted to the Wyoming Legislature for large project funding utilizing the WWNRT, which seeks funding greater than or equal to $200,000. This Bill has been approved by the Legislature and has been signed by Governor Freudenthal. This funding will go a long way in helping us achieve our goals.

The next phase is to implement a 700-acre prescribed burn during the spring and/or fall of 2007. We have contracted FireTrax, LLC to conduct the prescribed burn. In addition to the prescribed burn, we will continue cutting conifers that have encroached other aspen stands. Our goal is to treat approximately 5,000 acres of aspen and as many, if not more, big sagebrush communities within the Bates Creek watershed to restore hydrology and natural vegetative processes, which have been interrupted primarily through fire suppression. We estimate it will take approximately 16 years to completely treat what we currently have delineated.

In September 2006, we established aspen density transects which will be used over the next several years to monitor aspen response. Our initial efforts show an aspen response from 4,400 stems per acre all the way up to 102,400 stems per acre (Figures 3 and 4). The fall 2005 prescribed burn had the greatest response, which we attribute to a hotter burn.

Figure 4. Aspen regeneration following spring prescribed burn.

Bates Creek Water Yield Study

Paired basins were selected for a study that will calculate the water yield resulting from prescribed burning of conifers, aspen and sagebrush. The basins drain to Spruce Creek and East Fork Bates Creek. They share a southwest aspect and 1.72 miles of common perimeter. The Spruce Creek tributary basin comprises 1316 acres bounded by a 6.9 mile perimeter and drains to an elevation of 7360 feet, whereas the East Fork Bates Creek basin measures 1417 acres and is bounded by an 8.3 mile perimeter, draining to an elevation of 7560 feet (Figure 5). Pretreatment data will be collected for two years on both basins and treatment of the East Bates Creek basin will begin no less than two years after treatment begins in the Spruce Creek tributary basin.

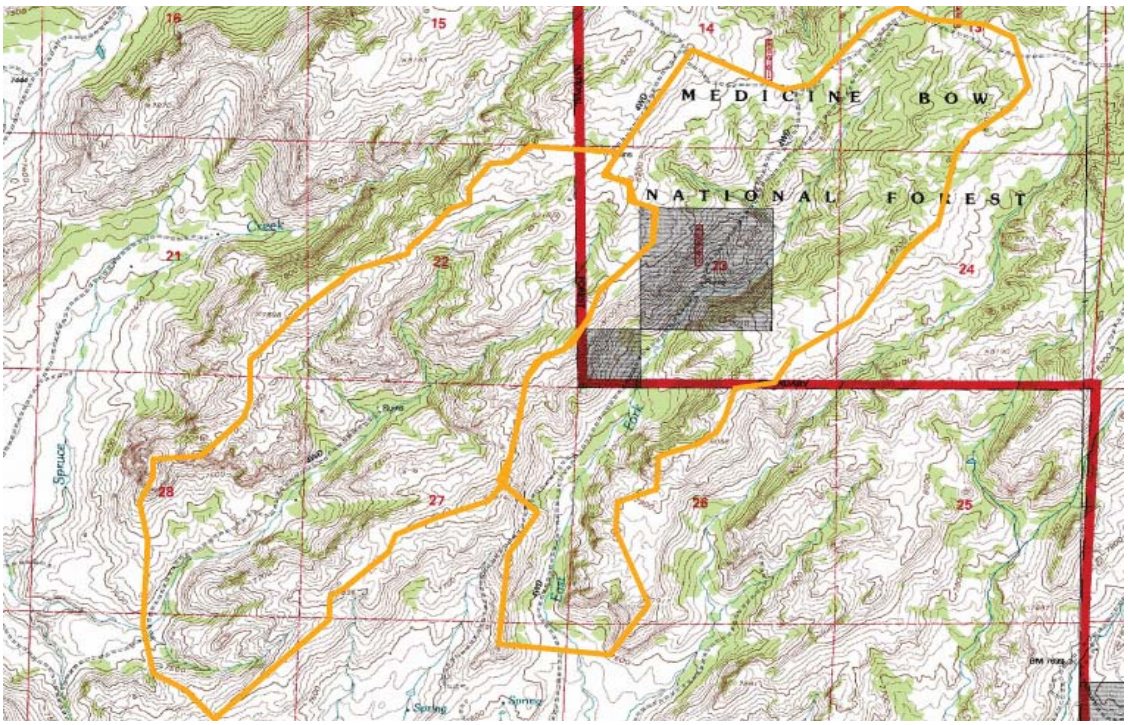

Figure 5. Paired basins selected for water yield quantification from vegetation treatments. The western basin drains to Spruce Creek. East Fork Bates Creek runs through the eastern basin.

Bates Hole Landcover Classification Project

A habitat biologist intern continued to refine the landcover classification within the Bates Hole mule deer herd unit. The intern provided feedback on how accurate the landcover classification was, and made changes where necessary to more accurately reflect the vegetative communities that currently exist within this area. We started the process in this area due to its importance to sage grouse, and the need to have sage grouse habitat delineated in the Hat Six region of the herd unit. The resulting landcover modifications will allow us to categorize habitats as potential sage grouse nesting, brood rearing or winter habitat as defined by the Western Association of Fish and Wildlife Agency guidelines.

- Rattlesnake Hills and Thunder Basin project was completed in the fall of 2006.
- 162 acres cut and RX burn Bates Creek watershed.
- Big sagebrush annual growth averaged 0.59 inches.
- 52 percent increase in big sagebrush production Rattlesnake Hills.
- $22,700 of funding was acquired to build elk exclosures Roaring Fork Aspen Project.
- Beaver transplanted to Bolton Creek persisted through the winter and were evident in spring.
- 31 individual landowner contacts were made by Habitat Extension Services.
- Water yield study planned for bains with RX burning.

Bates Hole Habitat Inventory and Evaluation Area

Casper Region personnel wanted to convey to the public how production and utilization was affecting the big sagebrush community; hence we developed a use index. The use index continues to depict an upward trend, which indicates detrimental impacts are occurring to the big sagebrush community (Figure 6). These impacts include, but are not limited to, decline in plant vigor, poor seed production, increased plant mortality and reduced carrying capacity. In 2003, we documented the highest level ever recorded on the use index, which was the result of poor production (0.51 inches) and an average utilization level of 38 percent.

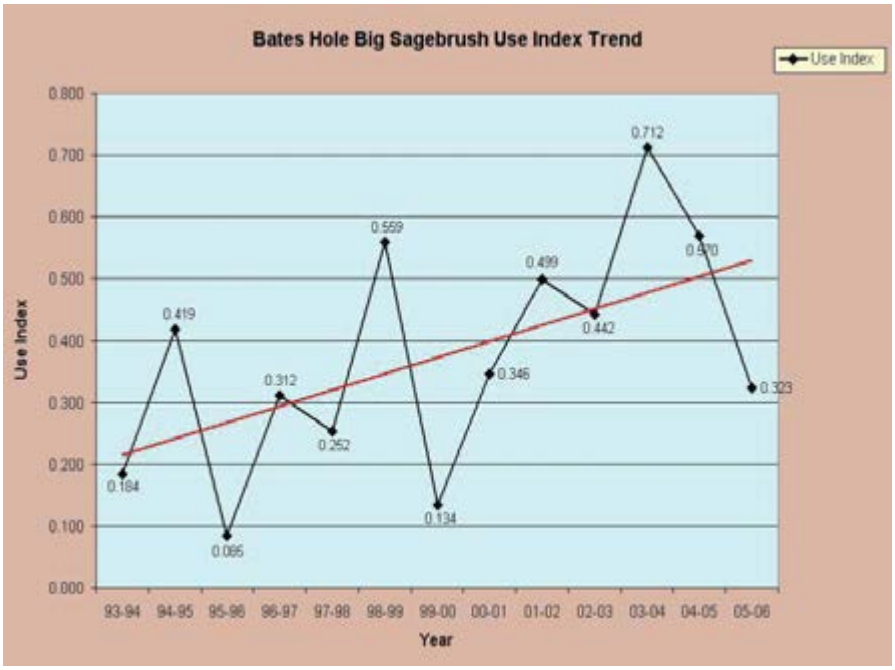

Figure 6. Bates Hole big sagebrush use index with trend line.

Big sagebrush annual growth averaged 0.59 inches in 2006, which is 14 percent greater than 2004, and 54 percent greater than 2002. We have documented a 64 percent decline in big sagebrush production between 1995 and 2006 (Figure 7).

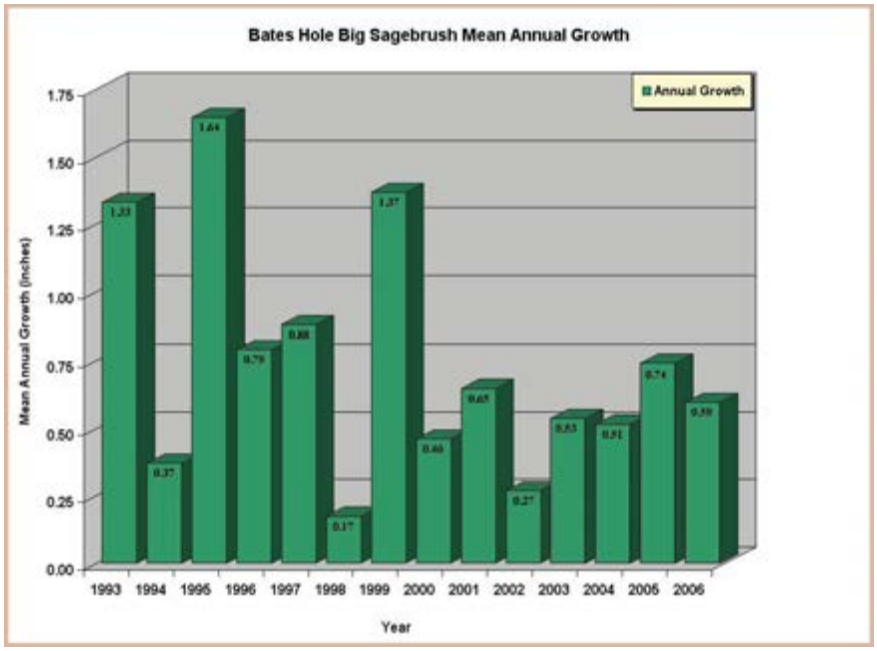

Figure 7. Bates Hole big sagebrush mean annual growth.

Roaring Fork Aspen Project

To preserve aspen that are heavily browsed in the drainage, $22,700 of funding was acquired to build elk exclosures. Aspen stands were prioritized for protection by current browsing intensity. The material originally sought to construct exclosures is no longer available. We are now looking into alternative materials. Exclosures will be constructed in 2008.

Watershed Habitat Assessment Method (WHAM) data were collected for Ashenfelder Creek and Roaring Fork Creek.

North Platte River Sauger Reintroduction Habitat Assessment

For years there has been an interest in restoring sauger to the North Platte. This action would put a second resident river sportfish in front of anglers below Dave Johnston power plant, increasing the utility of WGFD public access as well as restoring a native fish. There are 66 miles of river between the Dave Johnston power plant and Glendo Reservoir that could potentially be sauger habitat. Temperature loggers were set at the WGFD Bixby Access, river mile 6 below Dave Johnston Power Plant; the South Douglas Access, river mile 41; and at Orin Bridge, river mile 55; through the spring and summer to assess the possibility of hybridization of sauger

with walleye already in the system. Walleye and sauger remain genetically pure in many sympatric populations. They segregate in part by the temperatures at which they spawn, with walleye entering rivers and spawning two weeks earlier than sauger. Inspection of the datalogger readouts indicates a significant effect of the Dave Johnston power plant thermal effluent (Figure 8). Both sauger and walleye could be in the river at the same time attempting to spawn. More dataloggers will be deployed in 2008 from the power plant down to the South Douglas Access to determine the downstream extent of the effect. A literature analysis of sauger and walleye temperature and habitat preferences will also be performed.

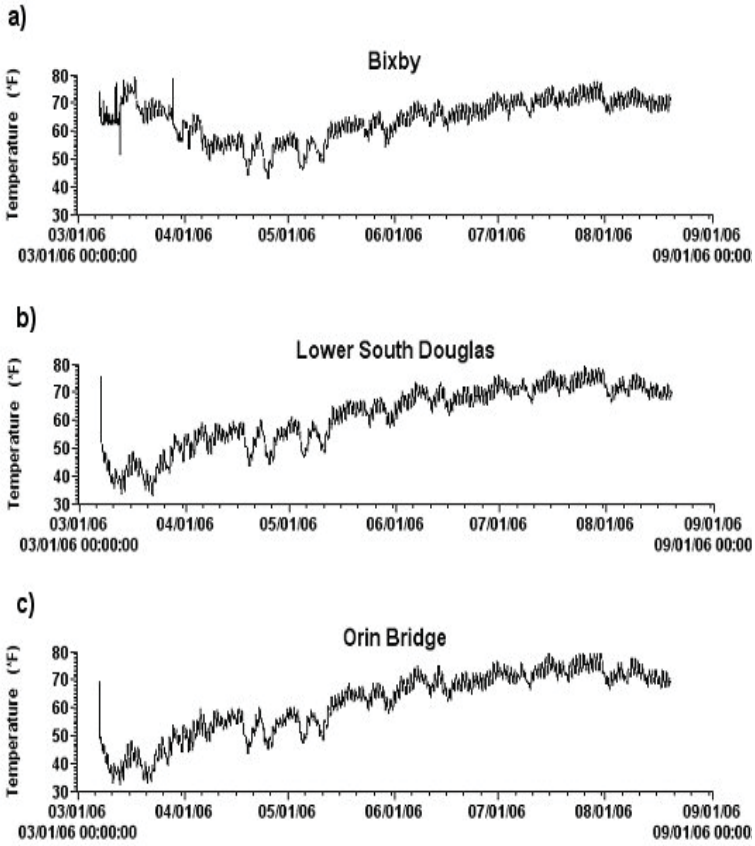

Figure 8: Temperature logger readouts at river miles 6 (a), 41 (b), and 55 (c). The elevated temperatures at Bixby during the spawning period can be seen until late April when irrigation flows begin to swamp the effect.

Miracle Mile Spawning Enhancement Structure

In January 2006, the sill and gravel project was visited to 1) track changes to the sill structure since the previous visit in March 2005, 2) collect survey data for further calibration of a 2D model that predicts brown trout spawning habitat over the gravel patch and 3) to help evaluate whether further sill modification was necessary. Over 600 locations across the sill and immediately up and down stream of the sill were surveyed over a 2 day period. Survey data includes x, y, and z coordinates collected relative to reference pins located throughout the study area. At each survey location, length of the intermediate axis of a substrate particle was recorded to provide a roughness estimate. Depth and velocity were directly measured at 103 of the locations to evaluate and calibrate 2D model predictions.

Table 1. Stage and discharge measurements. Upstream stage is measured at the upper end of the study reach/side channel and downstream stage is measured at the lower end of the study reach below the sill.

Date	Stage Downstream (m)	Stage Upstream (m)	Channel Discharge (cfs)	Gage Discharge (cfs)
4/21/2004	95.94	97.95	225	546
7/1/2004	96.18	98.18	670	1613
11/10/2004	95.94	98.01	---	530
11/23/2004	95.94	98.01	168	522
3/25/2005	---	97.98	---	520
1/18/2006	95.95	97.99	228	526

Sill modifications during 2005 were reflected in a 0.4 m (1.3 ft) lowering of the lowest boulder. The water surface upstream of the sill was 10 cm (~4 inches) lower in 2006 even though slightly more water was flowing in the side channel (Table 1). Therefore it is clear that sill modifications lowered the water surface elevation as anticipated. Also from Table 1, the percentage of flow going down the side channel has returned to pre-project levels.

Flow during measurement periods ranged from (168 cfs – 670 cfs) and downstream stage ranged between 95.94 and 96.18 m (Table 2). A rating at the downstream end of the study reach was developed to provide input water surface elevations for the River2D program. The rating equation was: stage height (m) = 0.0185 * discharge (m3/s) + 95.828 (R2 = 0.9987).

Measured physical conditions over the gravel patch are reported in Table 2. Measurements collected on trout spawning redds downstream in 2004 show that most redds are associated with average column velocities of 0.49 to 0.61 m/s and depths between 0.20 and 0.65 m. Water velocities over the gravel patch on January 19th, 2006 were below that range (Table 2). Depths, however, were ideal for spawning brown trout.

Table 2. Depth, velocity and estimated intermediate particle dimension measured January 18, 2006 at locations within the "gravel patch" upstream of the sill.

Statistics	Average Column Velocity (m/s)	Depth (m)	Diameter (cm)
Mean	0.395	0.43	5.1
Median	0.378	0.43	5
Minimum	-0.10	0.24	2
Maximum	0.756	0.64	10
Number	31	31	77

The 6.46 m3/s flow observed in January 2006 is approximately the flow expected most years during October and November when brown trout are spawning. The weighted useable area index (WUA) to brown trout spawning habitat at 6.46 m3/s is 293 m2 (Figure 9). This is about 50% of the maximum value that theoretically

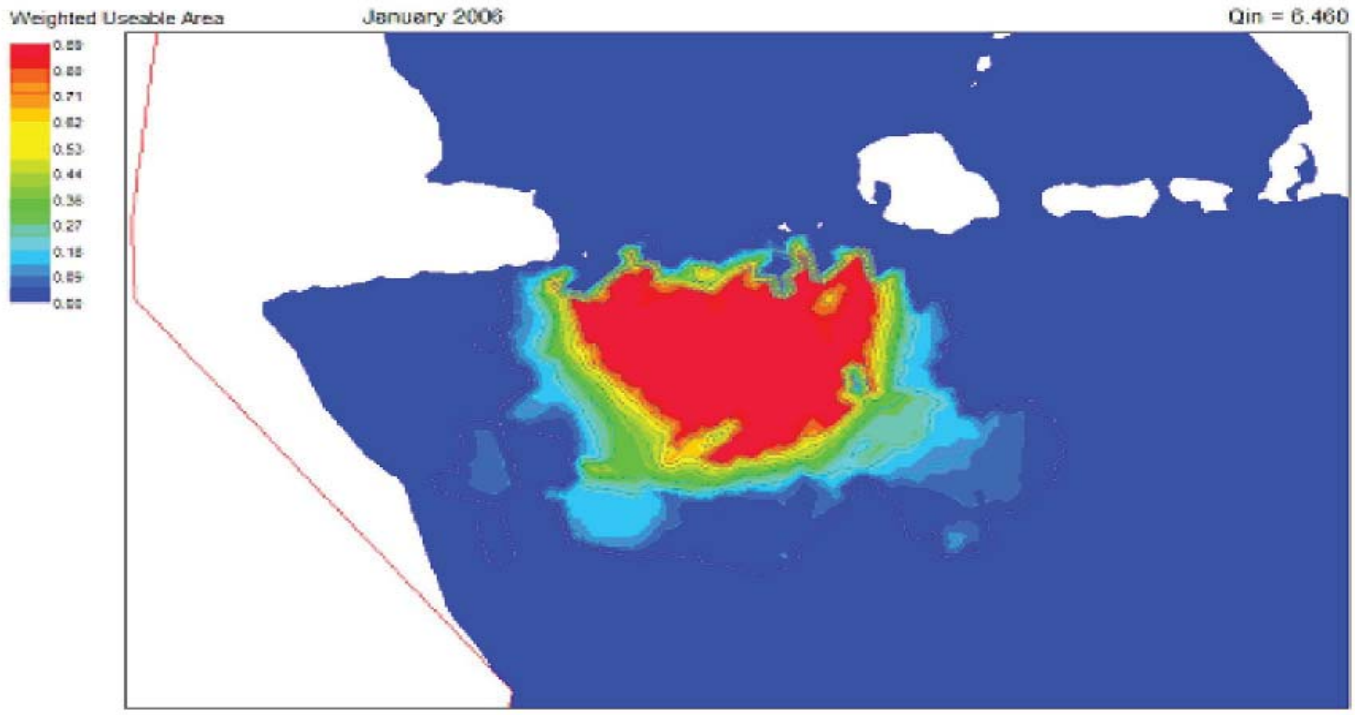

Figure 9. Screen shot from River2D illustrating spawning brown trout physical habitat upstream of the sill on January 18, 2006. Perimeter line marks the extent of the spawning gravel.

could occur if ideal depths and velocities could be created at every point over the gravel patch. While depths were ideal over most of the gravel patch, simulated velocities around the perimeter of the gravel patch were slower than ideal, limiting the overall spawning suitability. Backwater depth could be decreased slightly more to increase water velocities.

Peak brown trout spawning conditions over the gravel patch occur when discharge in the side channel is 11 m3/s (388 cfs) corresponding to a Kortes Reservoir release of about 903 cfs. The peak in WUA occurs in conjunction with higher, more suitable water velocities and suitable depths. The relationship between flow level and the WUA spawning index is fairly flat (i.e. modest gains as a function of flow) with over 80% of the maximum WUA (341 m2) occurring over the flow range 6 m3/s to 15 m3/s (Table 3). Given the choice, however, habitat conditions for spawning brown trout are expected to be higher at the higher flow levels due to additional flushing of fine sediments from the gravel interstices and delivery of oxygen to developing eggs.

Table 3. Flow release from Kortes, side channel flow, and brown trout spawning weighted useable area based on sill structure and channel conditions measured in January, 2006.

Kortes Flow Release (cfs)	Side Channel Flow At 43% of Release (cfs, cms)	Weighted Useable Area (m^2)
411	245 (5)	245
493	212 (6)	281
530	228 (6.46)	293
574	247 (7)	304
656	282 (8)	320
739	331 (9)	331
821	353 (10)	338
903	388 (11)	341
985	424 (12)	337
1232	530 (15)	285

Redd counts on the supplemented ravel were conducted in late October and November. No redds were seen in October. The highest count in November enumerated sixty-one attempted or successful redds. In consideration of the fine sediments being deposited on the gravels, freeze-coring is being evaluated as a method to examine egg viability under the current configuration of the structure.

National Grassland Big Sagebrush Inventory

Big sagebrush production in the Newcastle area decreased 148 percent in 2006 as compared to 2005. The significant decrease in annual growth is attributed to the decrease in spring precipitation, and plant health, condition and vigor. Since monitoring efforts began in 2001, we have documented an upward trend in annual growth, even though 2003 was below average and 2004 was well below average (Figure 10). The big sagebrush annual growth difference between the three sites can be attributed to big sagebrush plant condition at Frog Creek and 6-mile Basin. The plants at these two sites are more decadent, and heavily hedged, whereas the plants at the Highway 85 site are mature, more vigorous and are not as heavily hedged.

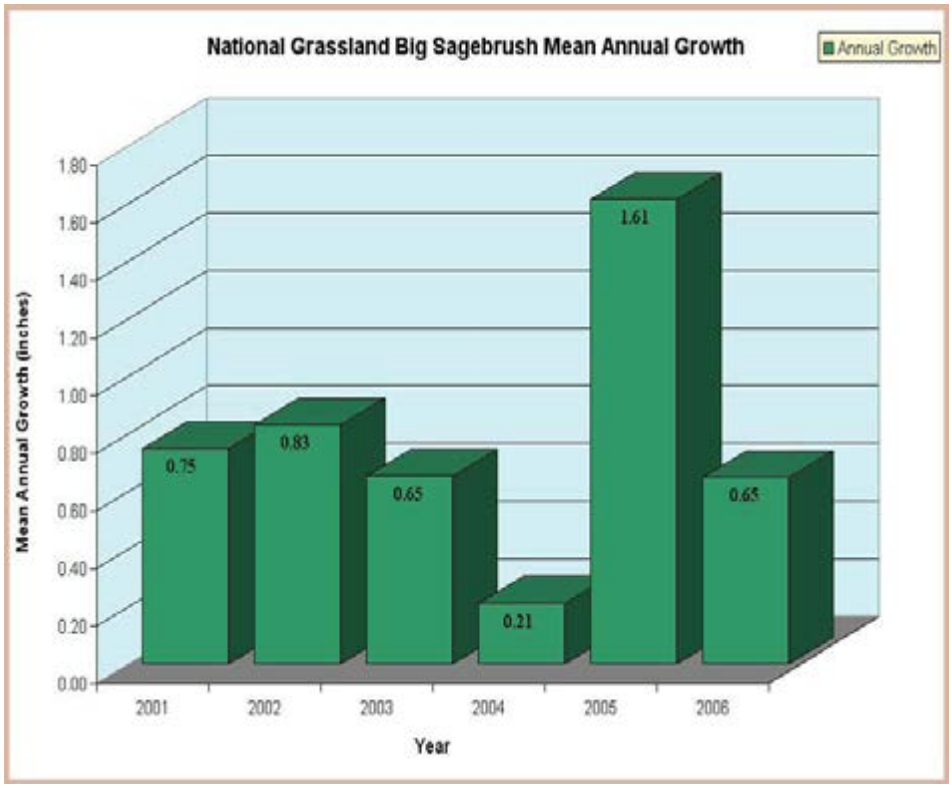

Figure 10. National Grassland big sagebrush mean annual growth.

North Laramie Range Habitat Initiative Project

True mountain mahogany annual growth averaged 2.01 inches during 2006, with a range from 1.68 inches to 2.54 inches. Annual growth has increased 62 percent since 2004, and has decreased 44 percent since we began monitoring efforts in 2000 (Figure 11). This downward trend may be contributing to the mule deer population declines wildlife biologists have documented over the past several years. We realize spring precipitation plays a vital role in true mountain mahogany annual growth, but we believe the limiting factors of annual growth in this area are plant health, condition and vigor. With this in mind, we contacted private landowners during 2006 to determine if there is interest in implementing habitat improvement projects, specifically prescribed burns, within the true mountain mahogany community. Our efforts have paid off, and we will implement a prescribed burn during the fall of 2007, weather permitting.

Figure 11. Laramie Range True mountain mahogany Mean Annual Growth.

Rattlesnake Hills Habitat Inventory and Evaluation Area

Big sagebrush annual growth in the Rattlesnake Hills area averaged 0.41 inches, a 64 percent decline since 2004 (Figure 12). We have documented an upward trend in big sagebrush production since 2000, whereas in Bates Hole the trend is downward. Since monitoring efforts began, there has been a 52 percent increase in big sagebrush production. Big sagebrush utilization has been well within acceptable parameters, which may be attributed to pronghorn shifting their winter concentration areas further to the south and east. Secondly, we have not encountered a severe winter season for almost a decade in this area, and as a result, the pronghorn may be scattered throughout their range and not concentrated on the designated winter range.

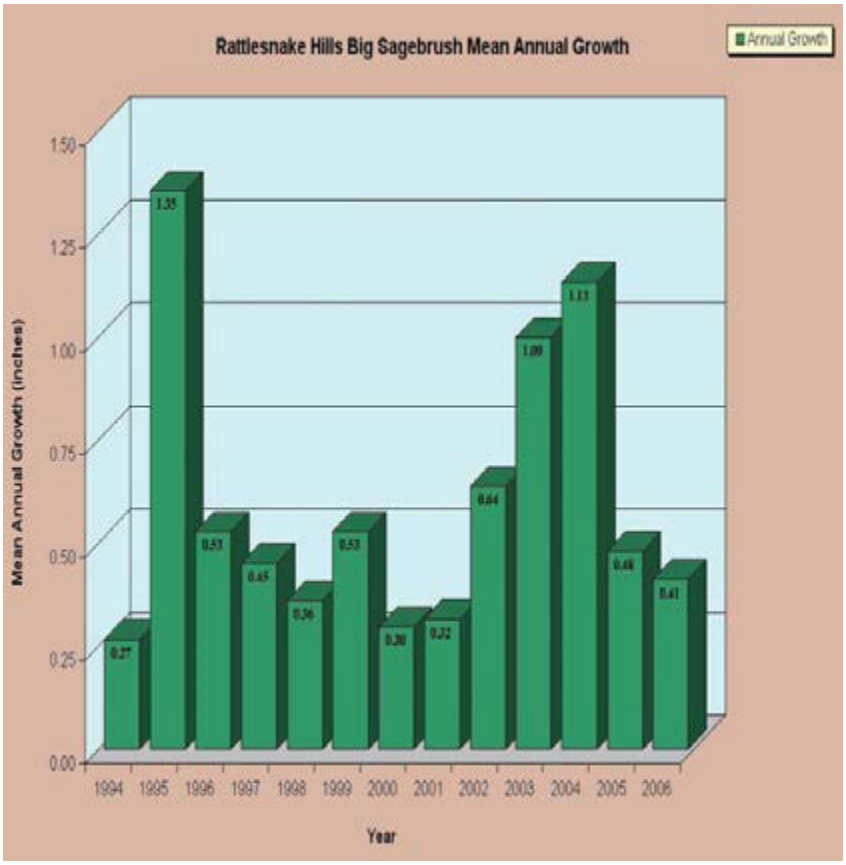

Figure 12. Rattlesnake Hills big sagebrush mean annual growth.

Casper Region Shrub Steppe Change Detection Project
The completion report for the Rattlesnake Hills and Thunder Basin project was completed in the fall of 2006. The report details the methods used to acquire the landcover classification, snowmap, changes in big sagebrush abundance and distribution, and changes in vegetative "greenness" to determine annual grass abundance and distribution. Furthermore, it provides the results of these efforts, and discusses the advantages and disadvantages of using these data to map vegetative communities and the changes that occur within these communities over time.

The next phase will be to further refine the landcover classification in those areas where the contractor had difficulties mapping vegetative communities. This process may take several years to complete due to the size of the project areas, and the amount of man-time required to make these modifications. Once complete, these data will provide a valuable planning tool in identifying areas for habitat treatments, rehabilitation of degraded vegetative communities, developing mitigation alternatives and management recommendations on future actions in these areas.

Martin Ranch Range Improvement
The project was initiated by then NRCS biologist, Rory Karhu to improve the control of cattle and management of the range by implementing a rotational grazing system and a brush management plan on a 750-acre allotment. Since Rory's departure, the project has been administered by the Casper habitat extension biologist. In the spring of 2006, 130 acres of dense mountain big sagebrush was burned under prescription by FireTrax LLC and approximately 23,000 feet of 3-wire electric fence was constructed to divide one large pasture into three (Figure 13). Post-treatment monitoring indicates more than three times the herbaceous productivity and heavy wildlife use by mule deer, elk, and sage grouse (Figure 14).

Figure 13. Spring 2006 sagebrush prescribed burn.

Figure 14. Sage-grouse use following prescribed burn.

In spring 2007, we plan to burn approximately 350 acres of dense sagebrush in the adjacent areas and construct approximately 8,750 ft of 3-wire electric fence to better control livestock. The project is cost-shared through USDA-EQIP and the Bates Hole/Shirley Basin sage-grouse local working group funds. In addition, there are plans to treat the adjacent aspen stands as has been done through the Bates Creek Watershed Restoration Project in future years.

Casper Bureau of Land Mangement Field Office Resource Management Plan
The Terrestrial Habitat Biologist served as the WGFD State Cooperator on the Casper BLM Field Office Resource Management Plan revision. This plan will guide BLM management efforts the next 15 to 20 years. This will affect wildlife habitat conditions and management opportunities for many years an Department input and recommendations required a considerable amount of time and commitment.

Figure 15. Eroded bank prior to 2007 cCRP of Bates Creek.

Figure 16. Fence-line contrast on Crook Creek caused by wild horses prior to EQIP exclosure planned for 2007.

HABITAT EXTENSION SERVICES

Terrestrial Extention Services

In 2006, 31 individual landowner contacts were made. Technical and cost share assistance was provided to private landowners who are planning or implementing projects including: noxious weed management, seedling tree and shrub plantings, livestock/wildlife water developments, range inventories/rotational grazing system plans, sagebrush treatments, riparian improvements and buffers, animal feeding operation improvements, and wildlife inventories. Currently, the extension biologist is involved in 2 continuous CRP (riparian buffer or shelterbelt) projects, assistance with 9 new Environmental Quality Incentive Program (EQIP) projects, 3 Wildlife Habitat Incentive Program (WHIP) projects, 1 Farm and Ranch Protection Program (FRPP) easement, 2 wildlife inventory projects, and assistance with 7 ongoing EQIP projects and 2 Continuous Reserve Program (CRP) projects. Several projects are being coordinated with the Casper habitat biologist and the Bureau of Land Management (BLM) (Figures 15 and 16).

The extension biologist also served on the Bates Hole/Shirley Basin working group, assisted on the Hat Six Sage Grouse Study and provided assistance to the Northeast Sage Grouse local working group.

Sanchez Creek Riparian Habitat Improvement

Two exclosures were built with PLPW, HAMS and the extension biologist to protect riparian aspen along Sanchez Creek from cattle browsing. No aspen suckers were evident at the time of construction in October. Monitoring will begin in 2008. The extension biologist thought the riparian area would qualify for CCRP if the landowner were willing. Offsite water would be developed if the landowner were to enroll in CCRP.

Bolton Creek Beaver Transplant

Beaver transplanted to Bolton Creek in 2005 persisted through the winter and were evident in spring. By fall, evidence of their presence was not clear. Also, willows were in considerably worse condition than the previous year due to livestock browsing. It was learned the area was used by several operators to gather stock in the fall. In 2007, the landowner who requested the project will be approached to build an eight to twenty acre riparian exclosure to protect willows, or a 90 acre pasture for light usage. If there is interest, we will work with the NRCS to get funding; otherwise the project will be abandoned.

Bates Creek Stream Assesment

A habitat assessment and fish population estimate was conducted in response to a landowner interested in improving habitat and fishing on over a mile of Bates Creek. Three species of fish were found: rainbow trout, brook trout and creek chub. Trout numbers were low; 18 brook trout and 34 rainbow trout per mile. A trout biomass estimate of 11 lbs/ac is just 16.5% of the potential biomass estimate of 66.4 lbs/ac. Relative weights (Wr) a measure of overall body condition of brook trout, averaged 77 - reflecting post-spawn condition. Rainbow trout Wr ranged between 82 and 114 averaging 95.4. Cover and poor sediment routing were identified as the primary reasons for the low biomass in the reach. A letter with various habitat improvement alternatives will be prepared for the landowner. Temperature loggers will be installed in 2007.

Seminoe Road Gas Project
Seminoe Road Gas Project Contaminant Monitoring: One hundred fish representing five species: walleye, rainbow trout, brown trout, white sucker, and longnose sucker were collected for mercury and selenium analysis as baseline data prior to full gas field development and associated water releases. Previous analysis of Seminoe Reservoir fish has shown walleye to exceed 0.3 ppm mercury at about eighteen inches and 0.5 ppm at twenty-three inches. Preparation of fish for metals analysis is about two thirds complete. Data will be provided to Wyoming Department of Health.

LaPrele Creek Erosion Project
NRCS needed help in habitat recommendations and advice on reducing erosion for a LaPrele Creek landowner on about 2 miles of stream. A population estimate was completed to describe population structure in two unexploited reaches of water. The population was almost entirely brown trout, but for a few young-of-the-year and one yearling rainbow trout, suggesting temperature limitation. The landowner has decided to go ahead with erosion control and three instream habitat structures.

WILDLIFE HABITAT MANAGEMENT AREAS

Springer WHMA Reseeding
Casper Region Habitat & Access Crew, with assistance from the Statewide Habitat & Access Crew, reseeded 300 acres on Springer WHMA. Reseeding occurred after the Downar Bird Farm personnel and Habitat Biologist, conducted prescribed burns on the WHMA. The burn and reseeding is part of an overall plan to improve cover and forage on the WHMA.

Springer/Bump Sullivan WHMA Food Plots
Casper Region Habitat & Access Crew planted 19.25 acres of sorghum/sudangrass hybrid for wildlife feed and cover at Bump Sullivan WHMA on an old prairie dog town (Figure 17). This area was planted as part of an agreement with the local CRM to reclaim old prairie dog towns. In August, the crew planted winter wheat in those areas where the sorghum/sudangrass had not faired well from the extreme drought experienced last summer. Winter wheat provided green grazing through the fall and winter and will produce a seed crop earlier than other plants this summer.

Figure 17. Winter wheat planting at Bump Sullivan.

On Springer WHMA, 26.4 acres of sorghum/sudangrass hybrid was planted for wildlife feed and cover. Approximately half of the crop did not succeed due to extreme drought conditions (Figure 18). The crew replanted winter wheat in those areas. The food plots created food and cover for wildlife in previously unproductive.

Figure 18. Bump Sullivan non-irrigated sorghum/ sudangrass in late October.

Table Mountain WHMA Food Plots

The Casper Habitat & Access crew planted sorghum/sudangrass hybrid on 20.75 acres of irrigated land; planted 25.5 acres of winter wheat on a dryland site; and planted approximately nine acres of barnyard grass and smartweed in the dry beds of ponds 1, 5, and 7 (Figure 19). The sorghum/sudangrass hybrid provided excellent cover for pheasants.

Figure 19. Table Mountain irrigated food plot in early August.