Afton Elk Herd Unit (E105)
Brucellosis Management Action Plan
Final Draft- 10 October 2006

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A. Introduction

The Afton Elk Herd Unit (EHU) covers the western slope of the Wyoming Range to Tri-basin Divide, the Salt River Range, and west to the Wyoming-Idaho state border including Star Valley (Figure 1). The Salt River and the Greys River are the major drainages in the herd unit. This EHU lies within Lincoln County and covers 968 square miles (mi^2) of land. The U.S. Forest Service (USFS) is the major land management agency for this herd unit; it manages 79% of the surface area. Private property, restricted primarily to Star Valley, makes up most of the remaining area (19%). The major uses of the USFS lands include domestic livestock grazing and year-round recreation. Summer uses include fishing, camping, horseback riding and motorized all-terrain vehicle use. In the fall, hunting is the predominant use. During winter, both private and outfitted snowmachine use is common along the Greys River road, and in some of the tributaries of the Salt River Range and Wyoming Range. Livestock grazing also occurs throughout the Greys River watershed in the summer. Grazing allotments are predominantly cattle along the riparian bottomlands and domestic sheep on the uplands.

Approximately 795 mi^2 (82%) of the Afton EHU is considered occupied elk habitat (Figure 2). Of the total occupied elk habitat, there is approximately 662 mi^2 (83%) designated as spring, summer, and fall range. There are 4.5 mi^2 (<1%) designated crucial winter range, and 114 mi^2 (14%) are considered winter yearlong range. There are approximately 278 mi^2 (35% of occupied elk habitat) of land in the Afton EHU considered parturition range.

There are two feedgrounds: Forest Park feedground is located in the upper Greys River in Hunt Area (HA) 90, and the Greys River feedground is located near Alpine in HA 88. The Greys River feedground serves to prevent damage, co-mingling, elk from getting on Highway 89, and winter starvation. Forest Park serves only to prevent winter starvation of elk in the upper Greys River.

This Brucellosis Management Action Plan (BMAP) was prepared to develop strategies for dealing with brucellosis issues in the Afton EHU. Appendix 1 includes data and background information relevant to understanding, formulating, and implementing the plan.

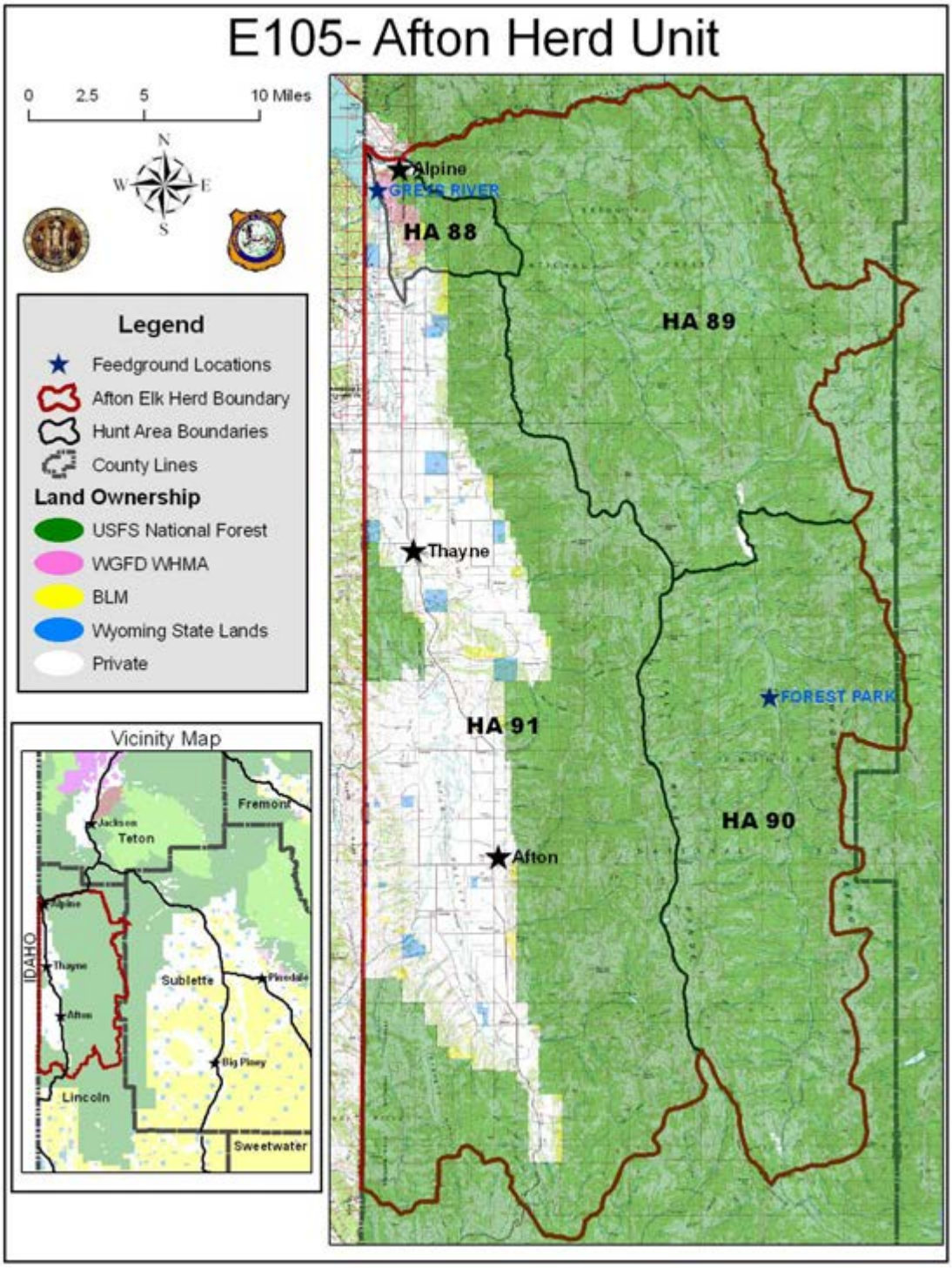

Figure 1. Land ownership, feedground locations, and Hunt Areas within the Afton EHU.

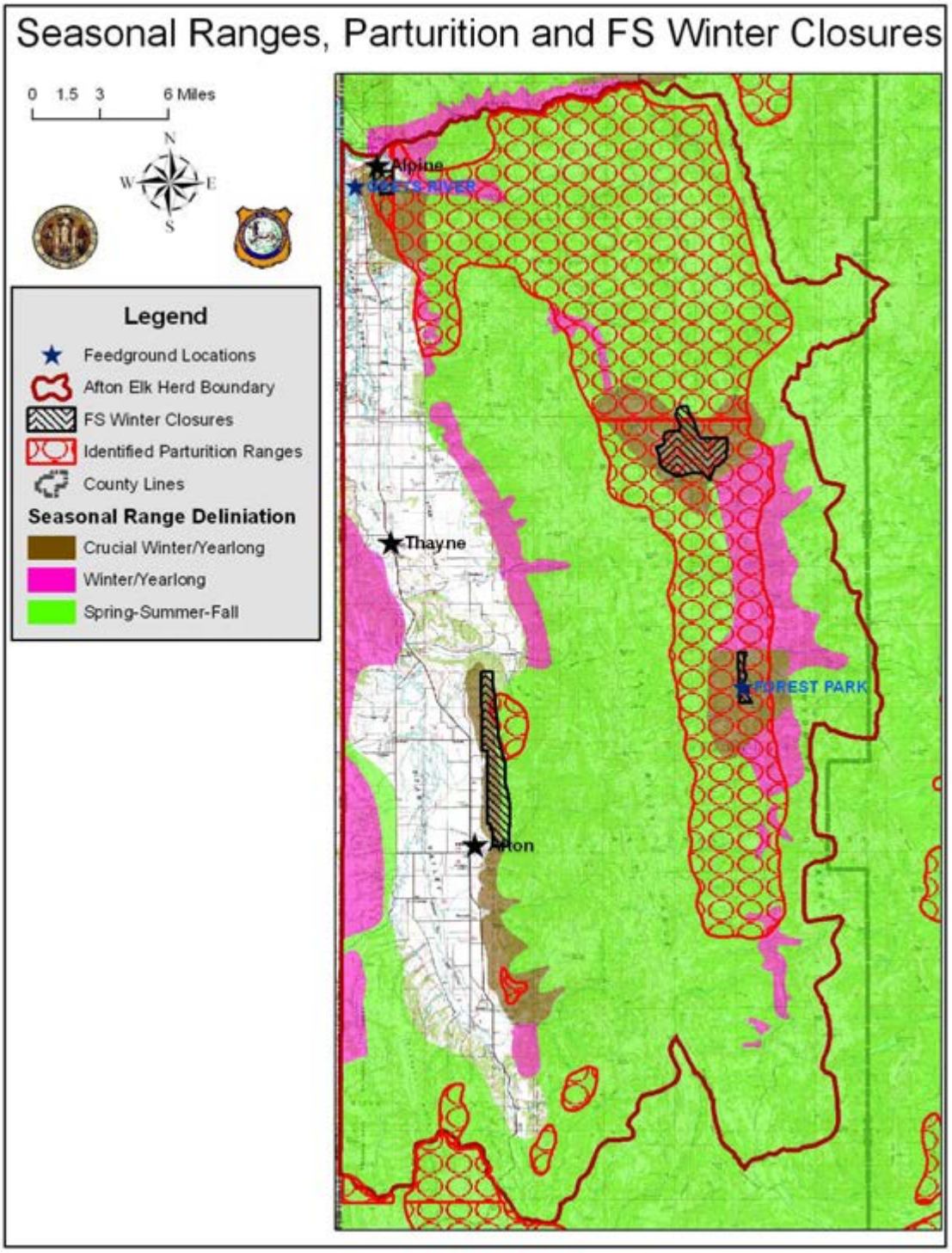

Figure 2. Seasonal elk ranges, winter range closures, and elk feedgrounds within the Afton EHU.

B. Brucellosis Management Options

The Wyoming Game & Fish Department (WGFD) currently employs several methods to minimize intraspecific transmission of brucellosis among elk. Elk feeders are encouraged to feed hay on clean snow when possible to reduce inadvertent ingestion of contaminated feed and exudates. Elk are ballistically vaccinated with Strain 19 on 21 of 22 state feedgrounds, including both within this EHU, and currently on the National Elk Refuge (NER) to reduce abortion events. Attempts have been made to reduce the duration of the feeding season on each feedground. However, damage and elk/livestock co-mingling concerns typically determine the duration of feeding on many feedgrounds.

Damage and livestock-elk co-mingling concerns contribute to increased risk of intraspecific disease transmission among elk. In most circumstances, elk are not tolerated consuming private crops and co-mingling with livestock. Strategies to hold elk on artificial feed longer and hazing elk to feedgrounds are often employed to minimize these conflicts. These practices increase the chance an aborted fetus contaminated with *Brucella* will be contacted by elk wintering on feedgrounds, thus increasing exposure rates among elk.

Feedground management should continue to include the aforementioned methods currently utilized to minimize disease transmission. However, given current seroprevalence rates for elk feedgrounds and the recent brucellosis occurrences in cattle, these methods alone are not sufficient to reduce incidence of the disease in elk to acceptable levels and prevent future interspecific transmissions. Alternative management options should be evaluated.

The intent of this document is to summarize existing data associated with elk and brucellosis management in the Afton EHU, incorporate feedback from land management agencies and livestock producers, and develop a list of management actions that could reduce brucellosis prevalence in elk and the risk of interspecific transmission from elk to cattle; and indicate how each management option will be applied in the Afton EHU. This plan is adaptive, and periodic revisions will occur to address new disease management tools or technologies and to update information.

To reduce prevalence of brucellosis in elk on feedgrounds, given current technologies and efficacy of vaccines, feeding durations would have to be decreased or ceased, if possible, during periods of high transmission risk. Reduced feeding durations would increase co-mingling if implemented abruptly, but substantial reductions in elk numbers through hunting prior to initiating the option could reduce these situations. Each feedground is unique and was established to address a site-specific management problem. Thus, each feedground will potentially require a different approach if reducing the duration of feeding and/or eliminating feeding are to be pursued as viable options. Some feedgrounds may have no alternative options to supplemental feeding and/or no option to reduce the feeding duration given current herd objectives and other conditions. To reduce the risk of interspecific transmission, cattle and elk need to be separated both temporally and spatially during the risk period. Livestock producers may have the potential to alter management to maintain this separation. As with feedgrounds, each producer and their operation are unique and what may work on one ranch may not work on another.

Listed below are potential options for managing brucellosis on the two feedgrounds in the Afton EHU. A discussion of each follows, respectively. Short-term

objectives of these options are to prevent co-mingling of elk and cattle and reduce the prevalence of brucellosis in elk. Long-term objectives include eliminating the reservoir of brucellosis in wildlife in the Greater Yellowstone Area (GYA) if determined to be technically feasible, maintain livestock producer viability, reduce/eliminate dependence of elk on supplemental feed, maintain established elk herd unit objectives, improve range health, and maximize benefits to all wildlife. The Wyoming Game and Fish Commission (WGFC) will require support from various constituencies (agriculture, land management agencies, sportspersons, etc.) prior to pursuing the following options, and several options will require decisions from entities other than the WGFC.

1. Relocating feedgrounds to sites with increased geographic area for elk to disperse and increased distance from winter cattle operations.
2. Elimination of feedgrounds.
3. Reducing numbers of elk on feedgrounds through increased harvest.
4. Reducing numbers of susceptible cattle and stored crops in areas where co-mingling/damage are likely to occur during winter, or implementing changes in cattle operations by providing incentives to producers.
5. Elk-proof fencing of feedgrounds or private lands to prevent elk from drifting onto private land and reduce co-mingling.
6. Elimination of seropositive elk on feedgrounds through test and removal program.
7. Extensive habitat enhancement projects in suitable winter range areas that will reduce co-mingling/damage and/or will reduce elk dependence on feedgrounds.
8. Acquisition of native winter range through fee-title purchase, conservation easements, or other methods.
9. Strain 19 elk vaccination.

C. Discussion of Options

1. Feedground Relocation

Feedground relocation options are very limited in the Afton EHU. All risks of co-mingling occur during the winter and spring months in Star Valley and thus do not involve the Forest Park feedground. The Salt River Range separates Forest Park feedground from the livestock operations in Star Valley. Elk attending the Greys River feedground migrate in from all directions. Changing its location would either move it away from established elk migration routes or put it in closer proximity to the cattle herds to the south in Star Valley. Decision authority would lie with the WGFC. If more optimal locations for these feedgrounds existed, relocation should be considered.

Pros:

- may contribute to lower brucellosis prevalence
- elk would have increased area to disperse
- elk could be fed on larger areas and in more sanitary conditions
- elk numbers could be maintained at or near current levels

Cons:

- brucellosis prevalence may persist

- would require funds for erection of new structures, fences, roads, etc.
- difficulty habituating elk to the new site
- localized damage to vegetation
- might increase competition of elk with other species

2. Feedground Elimination

This option, given current conditions and herd objectives, is probably unfeasible for feedgrounds in the Afton EHU. However, if current conditions and herd objectives change, through implementation of one or more of options 3, 4, 6, 7, and 8, this option might become more realistic. The WGFC has the authority to make this decision.

Pros:

- would reduce the risk of intraspecific transmission of brucellosis and other density-dependent diseases
- would facilitate efforts to eliminate brucellosis in elk in the Afton EHU
- would reduce feedground and vaccination expenses to the WGFD

Cons:

- would increase the risk of property damage and interspecific transmission of brucellosis to livestock if implemented with current numbers of elk and /or prior to elimination of brucellosis in elk
- increased risk of property damage would entail increased fiscal and personnel resources from WGFD
- would increase elk winter mortality
- would lower the number of elk that could be maintained in the Afton EHU
- would reduce income to the WGFD due to reduced license sales
- would reduce hunter opportunity
- may increase potential for vehicle-elk collisions
- would eliminate the means for elk vaccination and test & removal program (offset by natural reduction in intraspecific brucellosis transmission)

3. Elk Reduction

Reducing elk numbers on the feedgrounds in the Afton EHU through liberalized hunting seasons could allow more flexibility to pursue options 2 and 6, and could lead to more favorable conditions for options 7 and 8. The WGFC has the authority to make this decision for those elk in Wyoming during the hunting season.

Hunting seasons in recent years actually have been designed to increase elk numbers on the Greys River feedground; the number of elk on this feedground has been below the Commission-established quota of 1000 since 1998. The quota for Forest Park feedground is 750 elk; the post-hunt population objective for the Afton EHU is 2200 elk.

Reducing the number of elk wintering off of feedgrounds, especially in HA 91, has been a goal of the WGFD for several years. Elk in this HA tend to contribute to co-mingling and damage concerns more than elk wintering on the feedgrounds. In HA 91, hunting seasons have been designed to harvest the antlerless segment of the population by increasing the number of days of general-license any-elk hunting, and increasing the number of limited-quota licenses.

Pros:

- might contribute to lower brucellosis prevalence
- would increase hunting opportunities in the short term
- would increase license revenues in the short term
- would decrease elk densities on feedgrounds
- potentially reduce conflicts on private lands
- would reduce costs of supplemental feeding and vaccination

Cons:

- the response of seroprevalence of brucellosis in elk when populations are reduced is unknown, yet it is unlikely to reduce incidence to an acceptable level assuming the remaining elk are still fed
- damage to private crops might still continue
- the general public may be unwilling to accept large reductions in elk numbers
- success might be limited to hunter efficiency
- would result in loss of some hunting opportunity in the long term
- will reduce license revenue in the long term (might be offset by reduced management costs)

4. Cattle Producer Change of Operation

This is an option that high-risk and other producers in the Afton EHU could implement to minimize/eliminate brucellosis risks to their herd. Brucellosis transmission potential within cattle and testing requirements associated with cow/calf operations would be eliminated if all cattle operations were yearlings, spayed heifers, and/or steers. Conversion to yearlings would also eliminate the need of storing most hay crops and winter feeding, reducing winter elk conflicts. Operations that feed through the winter can take small measures to avoid attracting elk such as feeding in the morning and feeding every day to keep feeding areas clean of hay. The opportunity for disease transmission is also greatly reduced if cattle and elk do not co-mingle between February and 15 June. Implementing facets of this option would require changes by the producer and possibly a favorable decision by the USFS to alter grazing permits.

Evaluation and implementation of alternatives in this option are totally under the jurisdiction of individual livestock operators, Wyoming Livestock Board, State Veterinarian, and the Animal and Plant Health Inspection Service (APHIS). Discussion and recommendations pertaining to this option should be contained in Individual Ranch Herd Plans for each livestock operation.

5. Fencing

Fencing of winter cattle feedlines could prevent elk from co-mingling with cattle. Elk-proof fencing around private stackyards can help in reducing an operation's attractiveness to elk. New fencing would require favorable decisions by the landowner. Where fencing stackyards is considered beneficial, WGFD provides fencing materials to landowners.

Elk-proof fencing around elk feedgrounds can contain most elk within a given area. A drift fence already exists for several miles (11 to the south and ½ to the north) along the Star Valley front from east of Etna to the Greys River feedground. Co-mingling is not an issue with elk that attend the Forest Park feedground, thus fencing should not be

necessary at that location. Fencing projects around the feedgrounds would require favorable decisions by the landowner (state and/or federal).

Pros:

- may reduce damage problems and complaints
- may reduce risk of elk-cattle brucellosis transmission
- may be successful in fencing off stored hay and small-scale issues
- reducing the attractiveness of particular operations to elk may lead to overall reductions in damage in the general area

Cons:

- costs may be prohibitive- for construction, maintenance and monitoring
- congregating all or most of the elk within the fence may be unfeasible
- long lengths of fencing could impede movements of other wildlife
- does not address seroprevalence of brucellosis in elk
- some producers may be unwilling to erect fences
- may require federal agency cooperation and potential National Environmental Policy Act (NEPA) compliance
- impedes Forest access
- takes away opportunities to view wildlife

6. Elk Test and Removal

This may be a future option, but will not be considered until results of the Pinedale EHU test and removal pilot project have been evaluated. This option could eliminate a percentage of the seropositive animals on a feedground. The number of aborted fetuses and associated fetal fluids contaminated with *Brucella* bacteria may be decreased. The rate of both intraspecific and the potential for interspecific brucellosis transmission associated with the feedgrounds in the Afton EHU might decrease given implementation of this option. The WGFC has the authority to make this decision.

Pros:

- might reduce brucellosis prevalence in elk
- might reduce elk numbers to more efficiently pursue options 2,6,7, and 8.
- might increase the tolerance of elk on private lands if brucellosis prevalence is substantially decreased
- would allow hand vaccination of all animals caught and worked in the trap

Cons:

- would require the erection of large traps on feedgrounds capable of working many animals with large holding pens, entailing substantial fiscal and personnel resources
- must be implemented on both feedgrounds for numerous years to minimize possibility of future increases in brucellosis prevalence.
- the general public may not support such an operation due to decreased elk numbers and a distaste for slaughtering wild elk
- does not address other potential diseases on feedgrounds
- not all seropositive animals may be infected

7. Habitat Enhancement

Habitat enhancement projects may reduce the time elk spend on feedgrounds. If habitat improvements are completed near feedgrounds or between summer range and feedgrounds, the enhanced forage produced will decrease the dependence of elk on artificial feed, snow conditions permitting. Reduced feeding durations and lower elk concentrations on feedgrounds, especially during the high transmission risk period, may decrease the probability of intraspecific brucellosis transmission events. Habitat enhancement projects also create vegetative diversity, enhance aspen communities, and improve range conditions for other species.

Forest Park feedground is on and surrounded by USFS land, and the Greys River feedground is bordered by primarily USFS land. Thus, decision authority is with the USFS for most areas. Consultation and cooperation with the affected grazing permittee would also be necessary. USFS personnel have indicated there may be opportunities for aspen/sagebrush treatments throughout the Afton EHU. Habitat enhancement options may continue to arise, and WGFD will continue close involvement with USFS to pursue habitat enhancement options. WGFD could also explore options to increase palatability of forage on the Greys River feedground, which is on land owned by WGFC. Increased forage quality in the fall may entice elk onto the feedgrounds and away from damage situations, without an earlier initiation of feeding. Habitat enhancements might be best used in conjunction with options 2,3, and 8 to achieve maximum success.

Pros:

- could reduce feeding duration and brucellosis prevalence
- would benefit many species of wildlife and, in some instances, cattle
- funding is available through government and non-government agencies

Cons:

- may have limited effectiveness in reducing dependency on supplemental feed in years of average or greater snow accumulations that make forage unavailable
- elk may not be tolerated on treatment areas when in close proximity to livestock
- requires changes in post-treatment wildlife and livestock management within the treatment area to ensure treatment effectiveness
- may increase likelihood of invasive species establishment

8. Acquisition/Conservation Easements

Disease transmission risk on feedgrounds in the Afton EHU might be decreased by managing lands adjacent to, or connected with, areas used by wintering elk. With adequate intact, healthy, and accessible elk winter habitat available, elk feeding may be reduced in this EHU. This option also secures habitat for other wildlife species. The buying or long-term leasing of land to be managed commensurate with wildlife benefits is an option that can be used to maintain stability and health of all wildlife populations. Decision authority is with the private landowner.

Pros:

- secures habitat for all wildlife
- long-term solution

- helps secure future revenues for the WGFD
- may facilitate options 2 and 7
- could reduce brucellosis prevalence in elk
- agreeable among landowners and agencies

Cons:

- expensive
- limited availability of lands with high potential for wintering elk or connecting to existing or potential elk winter ranges
- requires landowner willingness

9. Continuation of Strain 19 Elk Vaccination Program

The WGFD initiated this program in 1985 on Greys River feedground, and has vaccinated approximately 66,000 elk to date on 21 state operated feedgrounds and the NER. Elk cows and calves are vaccinated the first two years, then calves only thereafter assuming adequate coverage is maintained. Dell Creek feedground serves as a control population (i.e., no vaccination) to assess effectiveness of the vaccination program in reducing brucellosis seroprevalence in elk (see Appendix 1, section D).

Controlled studies with captive elk indicated Strain 19 elk vaccinates were around 30% less likely to abort than unvaccinated control animals after being challenged with *B. abortus* strain 2308 (69% abortion rate in non-vaccinated elk and 40% in vaccinates) (Thorne et al., 1981). However, brucellosis seroprevalence data from Dell Creek and Greys River feedground elk indicate no significant difference. Protection from *Brucella* induced abortions afforded by Strain 19 vaccination may not be sufficient to effectively reduce seroprevalence in elk on feedgrounds. This may be due to the potential for numerous elk to come into contact with a single infected fetus aborted on a feedground, and the potential that the infectious dose may overwhelm antibody protection. The decision authority lies with the WGFC.

Pros:

- may be reducing total number of *Brucella* induced and infected elk fetuses aborted on feedgrounds
- perceived by many to be an active disease management tool
- the logistics/tool of delivery has already been developed, just waiting for improvement in the vaccine itself

Cons:

- will be very expensive and require substantial fiscal and personnel resources
- has not shown to reduce seroprevalence in elk on feedgrounds
- elk must be concentrated on feedgrounds to ensure delivery is feasible

D. Coordination Meetings

Producer meetings

A meeting was held April 17th, 2006 to discuss brucellosis management options with livestock producers in the Afton EHU. Invitations were sent to about 180 cattle and dairy operations/individual producers from the Star Valley. Over 30 interested producers,

a representative from APHIS, two representatives from the Wyoming State Vet, and several representatives from WGFD attended. In addition to discussing each of the nine brucellosis management options (section C, above), WGFD personnel presented background information on brucellosis and strategies that have already been implemented. Development of specific management actions for each livestock operation was left for APHIS, the State Veterinarian, and producers to develop in the Individual Ranch Herd Plans.

Input from livestock producers was taken at the meeting, as well as for about two weeks after the meeting via telephone and mail. These comments were then incorporated into the evaluation of each management option.

A second producer meeting was scheduled for July 18, 2006 to further refine WGFD's brucellosis management options and to develop the following proposed management actions. Again, about 180 letters of invitation were sent to cattle and dairy producers in Star Valley; however, no producers attended.

Interagency coordination meeting

An interagency meeting was held in Alpine on June 12th, 2006 to discuss the Afton EHU BMAP. Five WGFD personnel attended, along with 12 other individuals representing the Wyoming Livestock Board, Wyoming State Veterinarian, Idaho Department of Fish & Game (IDFG), Bridger-Teton National Forest (BTNF)- Greys River Ranger District (RD), Caribou-Targhee National Forest (CTNF)- Palisades RD, CTNF- Soda Springs RD, and the Idaho State Department of Agriculture (ISDA). WGFD began by explaining the process of drafting the Afton EHU BMAP. Each of the nine brucellosis management options were then discussed. Several attendees were from out of state and were not familiar with the Afton EHU or the two feedgrounds. Thus there were many questions on background information, but there was not necessarily input given on each of the nine options.

It was suggested that feedground elimination would be more suited to Forest Park because there are no co-mingling or damage issues with that feedground. In regards to fencing, it was suggested that entire fields don't necessarily need to be fenced; smaller feeding areas can be fenced in which the cattle are only in for part of the day. It was noted that the test & slaughter project currently being conducted will achieve the greatest success as long as a high proportion of the elk can be captured. There was some concern stated over WGFD's policy of only vaccinating elk calves each year, i.e., perhaps it would be beneficial to re-vaccinate yearling and adult cows. In addition, personnel from the IDFG and ISDA discussed some of the steps they are taking to reduce intraspecific and interspecific brucellosis transmission in their state.

In addition to the meeting on June 12th, 2006, several other communications have been held between WGFD personnel in the Greys River RD of the BTNF. Personnel with the BTNF have indicated continued willingness to pursue habitat treatments that would reduce elk dependency on supplemental feed and increase use of native range. These discussions are ongoing (*Also see* Appendix 1, Section E for planned habitat treatments). BTNF and WGFD personnel regularly work together to coordinate habitat enhancement and monitoring projects.

E. Proposed Management Actions

1. Feedground Relocation

The WGFD will not pursue this option in the immediate future. Relocation options for both feedgrounds are not only limited, it appears that the feedgrounds are in as optimal locations as they can be for the purposes they serve.

2. Feedground Elimination

The WGFD will not pursue this option in the immediate future given existing elk brucellosis seroprevalence rates and public expectations for current elk numbers.

3. Elk Reduction

The WGFD manages for current, Commission-established, elk herd unit population objectives. Elk herd unit reviews occur every five years. Elk herd unit management, including population objectives for the Afton EHU, were reviewed and discussed at a public meeting during the spring of 2006. Following meetings and public input, the WGFD presented recommendations to maintain the current herd unit population objective at 2,200 wintering elk. The objective was approved by the WGFC on April 26, 2006. The WGFD will design harvest strategies to ensure elk populations are maintained at the established herd unit objective.

4. Cattle Producer Change of Operation

The WGFD will encourage cattle producers to implement any changes to their operations that decrease the risk of interspecific disease transmission.

5. Fencing

The WGFD will continue to provide stackyard materials wherever it is considered beneficial. WGFD will pursue this option as opportunities arise to reduce elk movements onto private property, while still allowing for movements of other species.

6. Elk Test and Removal

The WGFD will implement the recommendations of Wyoming Governor Freudenthal's Brucellosis Coordination Team (BCT) and carry out a 5-year pilot test and removal project on the three feedgrounds in the Pinedale EHU. Following the 5-year pilot project the WGFD will evaluate the technique and determine if this management option warrants further consideration and possible expansion into other herd units.

7. Habitat Enhancement

The WGFD will continue to coordinate with private and federal land managers and livestock permittees to develop and implement habitat improvements that may reduce elk dependency on supplemental feed. (*Also see* Appendix 1, Section E for planned habitat treatments.)

8. Acquisition/Conservation Easements

The WGFD will continue to pursue this option as opportunities, funding, and willing landowners arise.

9. Vaccination of Elk Calves

The WGFD will continue the ballistic Strain 19 elk vaccination program to determine efficacy of the program in reducing brucellosis seroprevalence in elk on feedgrounds.

F. Best Management Practices

In addition to the above options and commensurate with their short- and long-term goals, the following best management practices should be considered for elk feedgrounds. Some may be currently employed, and should be maintained. Others may or may not be viable options for individual feedgrounds.

Feedground Management

1. Encourage feeders to feed on clean snow.
2. Insist feeders recover any aborted fetus encountered and immediately submit to a regional WGFD office for testing.
3. Minimize feeding duration to maximum extent possible.
4. Where possible, implement large-scale habitat treatments at strategic locations near feedgrounds.
5. Maintain the ballistic Strain 19 elk vaccination program.
6. Prevent elk/cattle co-mingling.

G. Additional Actions

Brucellosis Surveillance

The WGFD currently traps and tests elk for exposure to brucellosis on 4 to 6 feedgrounds annually. This practice should continue on as many feedgrounds as possible annually to monitor prevalence of the disease. Surveillance allows assessments of the efficacy of the Strain 19 vaccination program and other strategies in use. Additionally, hunter-harvested elk brucellosis surveillance will occur annually in an effort to survey the entire state over a 4-year period. The WGFD also will be collecting blood samples from hunter-killed elk in HA 91 (Star Valley, Figure 1) during the 2006-2007 hunting season. The increased surveillance effort will contribute to an improved evaluation of brucellosis management strategies in the Afton EHU through a better understanding of the disease's distribution. Feedground surveillance efforts may be reduced during the Pinedale elk herd unit test and removal pilot project.

Information and Education

WGFD personnel regularly inform and educate various public factions about wildlife diseases, including brucellosis. Outreach, particularly from the Information & Education (I&E) branch, has included group presentations, regular news releases, interpretive signs at feedgrounds and crucial winter ranges, Game and Fish brucellosis website, and various brochures and publications. Participation in the Greater Yellowstone

Interagency Brucellosis Committee (GYIBC) and the Wyoming Brucellosis Education Team (WBET) has increased I&E brucellosis efforts on a statewide and regional level.

The importance of quality wildlife habitat and the substantial role fire plays in natural ecosystems are also stressed during public forums, as well as the role of feedgrounds and elk damage management activities. WGFD personnel make numerous private landowner contacts regarding habitat improvement projects, wildlife-friendly management techniques, or ways to prevent co-mingling of elk and livestock. Additional efforts are focused on area school groups and educational exhibits at events such as the WGFD's annual Hunting and Fishing EXPO and the annual elk antler auction in Jackson to inform children and their parents on the Brucellosis-Feedground-Habitat (BFH) program and brucellosis management.

These efforts should be continued to inform the public of WGFD's role in brucellosis management. Additionally, should any of the aforementioned options be officially adopted, I&E efforts should focus on why the option(s) was (were) pursued and what benefits may be realized. The public should be made aware of any proactive management embarked upon by the WGFD, and their interests in the actions should be heard.

Progress Reporting

Efforts associated with this plan and/or the Wyoming Governor's Brucellosis Coordination Team will be summarized and reported on an annual basis.

Research

Sound management of brucellosis in elk on feedgrounds and the risk of transmission from elk to cattle necessitates accurate and reliable data to facilitate decisions. Much of the research concerning brucellosis, feedground elk, and feedground management has focused on elk vaccination. Many aspects of feedground elk ecology, brucellosis transmission and pathology, and feedground management have not been investigated or sufficiently evaluated. Potential research topics that could assist in management decisions:

1. Relationship of seropositive vs. culture positive, and strain of *Brucella,* in feedground elk.
2. Characteristics of scavenging of aborted fetuses on feedgrounds; relationship of coyote densities and scavenging rates on feedgrounds.
3. Feedground elk parturition habitat site characteristics and proximity to cattle.
4. Effects of habitat improvement projects near feedgrounds on minimizing feedground dependence of elk (i.e. distribution, dispersal, length of feeding season, brucellosis seroprevalence).
5. Disease presence (other than brucellosis) and parasite loads in elk on feedgrounds.
6. Abortion and viable birth rates, and temporal and spatial distribution of abortions and births, in seropositive feedground elk.
7. Relationship of brucellosis seroprevalence and feeding duration.
8. Impacts of wolves on distribution of elk using feedgrounds.
9. Collect snow-water equivalency measurements in areas of habitat enhancement projects, both past and future, and explore relationships with elk use and distribution.

Literature Cited

Thorne, E.T., T.J. Walthall, and H.A. Dawson. 1981. Vaccination of elk with strain 19 *Brucella abortus*. Proceedings of the United States Animal Health Association 85: 359-374.

Appendix 1

A. Historic Elk Herd Management

Elk herd management regimes in the Afton EHU have been designed to maintain elk numbers established by the WGFC and prevent co-mingling and damage. Current Commission feedground quotas are 1,000 elk at Greys River and 750 at Forest Park. The current post-hunt population objective for the Afton EHU is 2,200 elk wintering on and off feedgrounds.

Feedground History

Starvation of elk during the winter in the Greys River drainage has been a concern to both the public and local Game and Fish employees, dating back as far as the 1920s. In 1929 the Department identified the Greys River (as well as the Gros Ventre and Upper Green Rivers) as an area where winter starvation of elk was of concern. Since that time, facilities designed to feed elk have been established at 6 different sites in the Greys River drainage (Figure 3). In 1929, a shed was constructed at the Forks and in 1933 facilities were constructed at Deadman Creek. Feeding facilities were constructed at Sheep Creek in 1938 and at Squaw Creek in 1939. By 1938-39 the Department had 4 feeding sites in the Greys River drainage. Some time after 1939, the feeding site at Squaw Creek was moved down Greys River to the flat a ½ mile above the present town of Alpine. Elk were fed here until 1947-48, although feeding had also begun in 1946 on the Salt River (present site). By 1949, elk were no longer fed in the Greys River drainage and all the elk were fed at the Salt River site, which retained the "Greys River" name. During the 1950s, the structures up the Greys River were removed.

Snowmachines became a factor in elk management in the 1960s; their development and use allowed the public to access the upper Greys River during the winter months where they could observe starvation firsthand. Snowfall was extremely heavy during the winter of 1977-78 and elk starvation became evident in late December (as opposed to March and April most other years). As a result, an emergency feeding operation was initiated. Hay was freighted to several locations (Spring Creek, Sheep Creek, Forest Park, Blind Bull, Deadman Creek, White Creek, Murphy Creek, and McCain Meadows) for much of the winter. Approximately 350-400 elk were fed. Following this emergency feeding, interest in establishing a feedground in the upper Greys River grew in intensity. In the summer of 1978 hay was stored on the flat adjacent to the Forest Park Campground; this feedground became a permanent operation the subsequent winter.

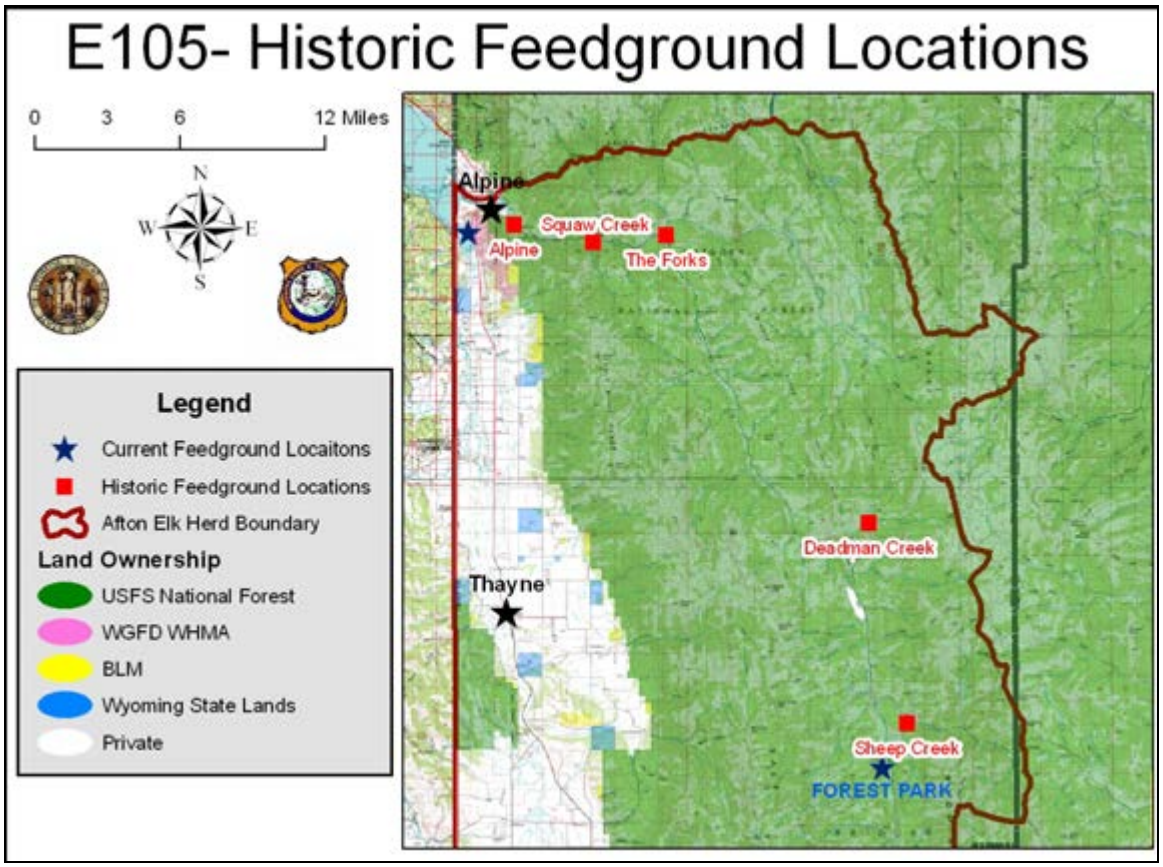

Figure 3. Historic and current elk feeding locations in the Afton EHU. See Feedground History for approximate dates of operation.

Damage History

The combination of deep snow accumulations and a primarily privately-owned valley floor has been cause for a long history of private-property damage by elk in the Star Valley. In addition to dairy and beef cattle operations, there are many horses in the Star Valley. Horse operations range from single-head to rental/outfitter businesses with over 100 head. Property damage has included damage to shrubs, fences, haystacks, growing alfalfa crops, and co-mingling with livestock.

Construction of an elk-proof fence between USFS and private property from the Etna area to Alpine was first completed in 1947 (Figure 4). The fence was built to keep elk off of private property and induce migrations to the Greys River feedground. Another 1½ miles of fence was added in 1950. During the 1970s and 80s, the Department opted to not maintain the elk fence. Significant elk damage problems from Etna north to the feedground occurred while the fence was in disrepair. In the 1990s, the WGFC instructed the Department to repair and resume maintaining the fence. The fence now extends as far south as the west side of Henry Mountain.

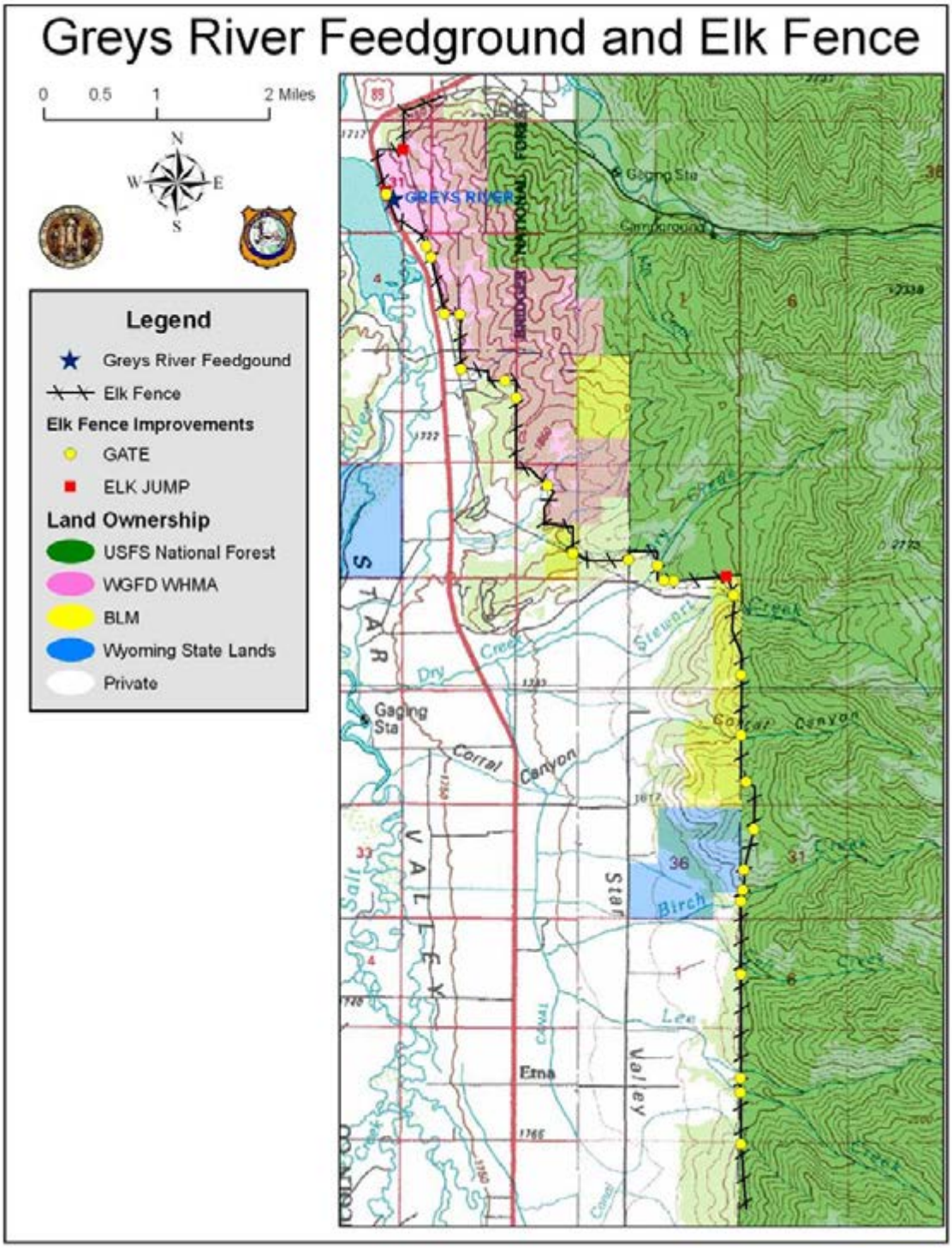

Figure 4. Greys River feedground and vicinity, showing the elk-proof fence.

In addition to the elk-proof fence, techniques for preventing elk damage in the Star Valley have included fencing haystacks, hazing animals away from the damage source, bait lines, emergency feeding operations to attract elk away from damage and co-mingling situations, trap and removal operations, hunting seasons structured to prevent

damage, and noise-making devices such as propane cannons, fuse rope, cracker shells, etc. Traps have been used in several locations in the valley to remove elk from damage situations. In most years, despite these efforts, not all damage has been preventable and some landowners have received monetary compensation (Figure 5).

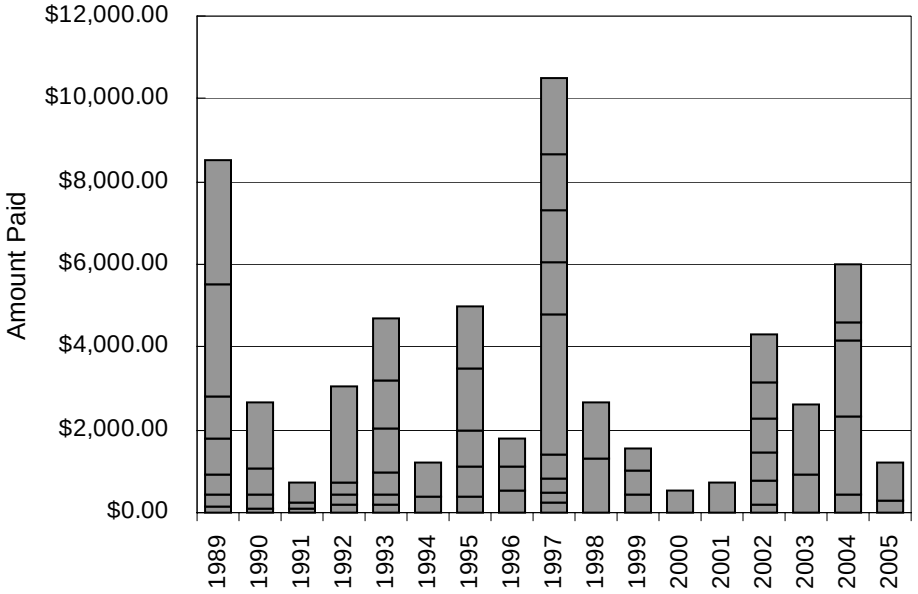

Figure 5. Damage claims (increments indicate individual claims) paid to landowners by WGFD for elk-specific damage from 1989 through 2005 in the Afton EHU. All claims occurred in HA 91. Claims do not reflect expenses incurred by WGFD for damage prevention activities.

B. Current Elk Herd Management

Management of this elk herd during the last five years has focused on maintaining the herd unit's bull: cow ratio at a minimum of 20 bulls: 100 cows and elk numbers within 10% of the population objective of 2200 elk. In 2005 a significant change in hunting structure occurred in Areas 89 and 90 in response to bull numbers and bull: cow ratios that have not met the management goal of 20 bulls: 100 cows. The hunting season in HA 89 was closed on October 25 in an effort to increase total bulls and total elk on the Greys River feedground. In HA 90 the antlered-elk portion of the general hunting season also closed on October 25, but the general season continued from October 26 to October 31 for antlerless elk only.

Hunting seasons in the lower Greys River, HA 89, have been designed to increase elk numbers on the Greys River feedground at Alpine. The number of elk on this feedground has been below the Commission-established quota of 1000 since 1998 (Figure 6). Since the majority of elk that winter on this feedground spend the summer and fall in the lower Greys River, hunting seasons in this area have been restricted to three to five days of general-license any-elk hunting in order to promote an increase in elk numbers.

Management direction has emphasized the harvest of antlerless elk throughout the EHU. Especially in HAs 90 and 91, hunting seasons have been designed to harvest the

antlerless segment of the population by increasing the number of days of general-license any-elk hunting, and increasing the number of limited-quota licenses. For several years there has been an added emphasis to kill cow elk in HA 91 through extending hunting seasons into December. Since the 2004 hunting season, the HA 91 type 1 licenses have been extended to January 31. These efforts have been mostly successful in minimizing elk depredations along the west slope of the Salt Range. However, there are still isolated numbers of elk that have been utilizing horse and cattle feedlines, damaging growing alfalfa crops and haystacks, or coming to feed provided by the public on private land.

In addition, movement of elk from Idaho summer ranges to Wyoming winter ranges in the western portion of HA 91 (Figure 1) that are adjacent to Idaho is highly dependent on winter severity. Since 1991, elk trend counts in this western portion of HA 91 have ranged from 121 elk in 1991 to a high of 869 elk in 1997. During the severe winter of 1996-97 there was a significant number of elk that moved from Idaho summer ranges onto Wyoming winter ranges on the western portion of HA91; at least 525 elk were provided supplemental feed from February to April. These elk are part of an interstate population that, functionally, is not part of the Afton EHU that occupies the Wyoming and Salt River Ranges. In 2000 a management decision was made to no longer count these elk as part of the Afton EHU. The primary reason they are no longer counted is because they do not spend the spring, summer, and fall in Wyoming and are generally not available to Wyoming hunters in the fall.

Population Estimate

The 2005 post-hunt population was estimated at 2,343 elk based on calculations accomplished by hand modeling (population objective: 2,200). Population estimates generated by POP2 modeling have significantly over-estimated the number of elk in this elk herd over the last 11 years. Trend counts from 2001-2005 observed 2,223, 1,945, 1,943, 2,029, and 1,945 elk, respectively. The current model projections indicate there were 5,218, 4,472, 4,163, 3,804, and 3,453 elk in the post-hunt populations during the same period. These population estimates generated by the model do not mimic or adhere to what trend count data suggests is occurring to elk numbers.

The reason for the discrepancies in the model-generated estimate and post-season trend counts are believed to be associated with herd unit interchange within Wyoming as well as with Idaho. There are three movements of sub-populations of elk that migrate into the Afton EHU from winter ranges that lie in adjacent Wyoming EHUs: Fall Creek, Piney, and West Green River. The most significant movement occurs from elk that winter on the Dog Creek, Horse Creek, and Camp Creek feedgrounds (Fall Creek EHU) into that portion of Area 89 located in Bailey Creek and Little Greys River. The amount of interchange between the Afton and Fall Creek EHUs is believed to be less than 10%, based on tag return data (*also see* Ear Tag Returns, below).

Trend Count and Herd Composition

Total elk numbers in the Afton elk herd have remained stable since 2000, even though numbers of elk counted annually on the Greys River feedground have been below the Commission-established objective by 19%-33% since 2000 (Figure 6). Herd-unit wide, the number of elk counted during annual herd composition surveys from 2000-2005 has averaged 1,941 elk.

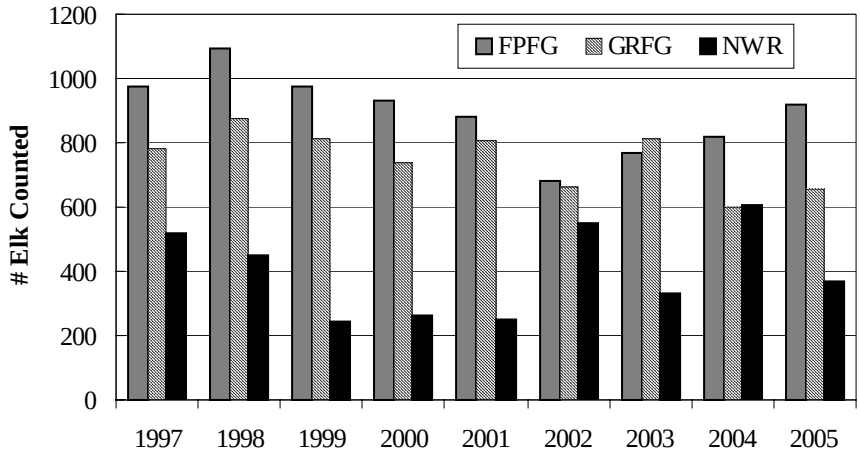

Figure 6. Number of elk counted on Forest Park feedground, Greys River feedground, and native winter range* during annual post-hunt trend counts.
*HA 91 accounts for typically 75-90% of all elk documented on native range.

Elk numbers have remained below the Commission quota of 1000 elk on the Greys River feedground for the last 10 years (Figure 6). Elk numbers on Forest Park feedground have remained within +/- 10% of the quota (n=750) from 2002-2004. In the winter of 2005-06, 919 elk were counted on this feedground. Since 1988 an average of 1724 elk have been counted on the Greys River and Forest Park feedgrounds annually. The number of elk on feed during this period averaged 80% of the herd unit total (Figure 7). The remaining 20% of the elk counted during annual trend counts were found on native ranges, and averaged 444 elk. Elk on native winter range in Star Valley have remained somewhat stable over the last 30 years. The 30-year average for the west slope of the Salt River Range is 140 elk. In 2005, 177 elk were counted.

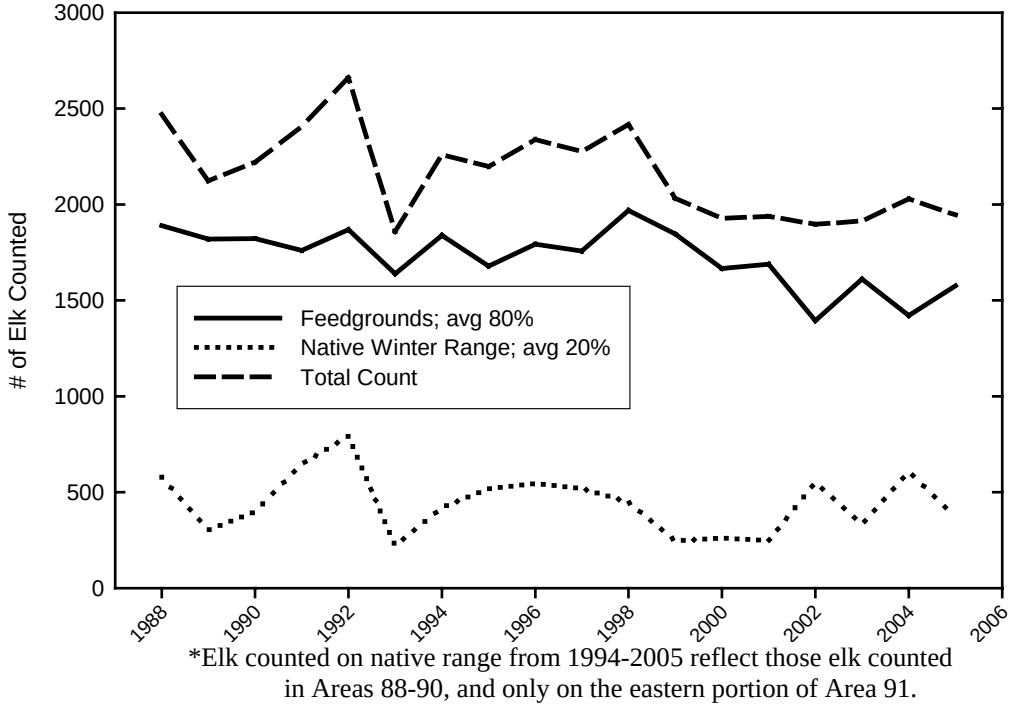

Figure 7. Number of elk counted in the Afton EHU on feedgrounds (Forest Park and Greys River combined) and on native range during annual post-hunt trend counts, 1988-2005. The herd objective is 2200 elk.

In 2005, the observed bull: 100 cow ratio was 29 bulls: 100 cows (Figure 8). This is the highest bull: cow ratio ever recorded in this herd unit, and it follows the lowest recorded bull: cow ratio in at least 25 years in 2004. In 2005, 17 branch-antlered bull: 100 cows and 12 yearling bulls: 100 cows are also record high ratios for this elk herd.

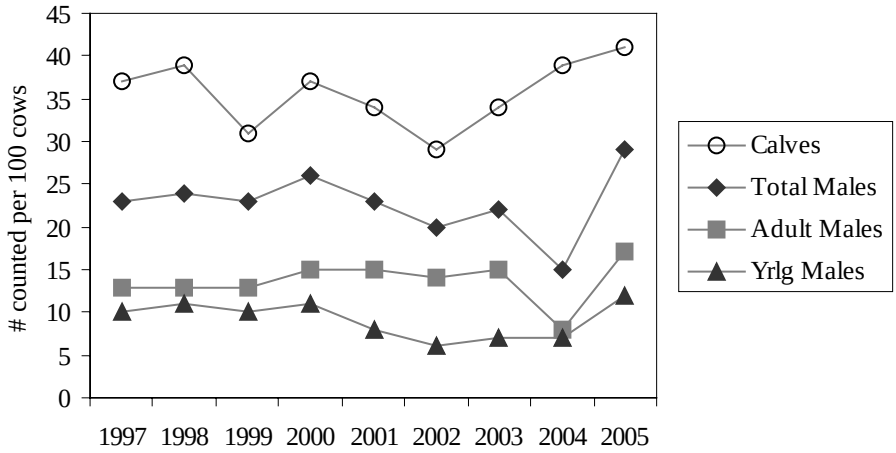

Figure 8. Ratio of calves, bulls, and spikes per 100 cows counted during annual post-hunt trend counts in the Afton EHU, 1997-2005.

A total of 472 calves were counted in 2005. The observed calf: 100 cow ratio from 2000-2004 was 37:100, 34:100, 29:100, 34:100, and 39:100 (Figure 8). In 2005, 41 calves: 100 cows were observed. The two feedgrounds supported most of the calves in the herd unit. On Greys River and Forest Park feedgrounds, 154 calves and 229 calves were observed, respectively. These two feedgrounds accounted for 81% (n=383 calves) of the calves observed in 2005. During the previous 5 years (2000-2004) an average of 73% of all calves counted were on these two feedgrounds. In Area 91, a total of 74 calves were counted and accounted for 16% of all calves documented in 2005.

Harvest

A total of 677 elk were harvested in 2005 according to the harvest survey. This is a decline from the 937 elk taken in 2004, and lower than the annual average of 870 elk taken during the period from 2000-2004.

Antlered harvest tallied 388 antlered elk (311 bulls and 77 yearling elk). Antlered elk comprised 51% of the total harvest in 2005. Branch-antlered bulls comprised 80% of the total antlered harvest in 2005, while yearlings only tallied 20% of the antlered harvest. In 2004, antlered elk tallied 54% of the total estimated harvest. During the 5-year period from 2000-2004, antlered elk made up average of 50% of the annual harvest. In 2005, antlerless elk composed 49% of the total harvest. The percentage of cow elk in the harvest increased from 34% (n=323 cows) in 2004 to 37% (n=248 elk) in 2005.

Hunter Success

During the 5-year period from 2000-2004 hunters have averaged 31% success while spending an average of 20 days for each elk harvested. The highest success and lowest number of days/harvest were recorded in 2004 (36% success; 17 days/harvest). During this same 5-year period, nonresident hunters achieved an average annual success of 36% success, while resident hunters recorded a 30% success rate. Nonresident hunters needed fewer days to take an elk than resident hunters. On average, nonresident hunters typically harvested an elk after 18 days of hunting from 2000-2004. During the same period, resident hunters usually harvested an elk after an average of 21 days of hunting.

Ear Tag Returns

A tagging program has been conducted periodically, since 1971, in conjunction with brucellosis surveillance activities in an effort to increase understanding of elk movements in and out of the Afton EHU. Animals have been trapped and tagged almost annually at Greys River feedground since 1971. Elk have been trapped and tagged at the Forest Park feedground occasionally since 1982 (1982-1986, again in 2001 and 2002). An evaluation of all known-location tag returns (n = 438) from elk tagged within the Afton EHU (1976-2003) indicates that 7% (n = 32) of tagged elk were killed outside the herd unit boundaries (Table 2). Tag returns indicate low interchange with surrounding elk herd units. Some movement *into* this herd unit occurs from the Fall Creek EHU, which borders the Afton EHU along the Snake River Canyon to the north, and the Grayback Ridge to the northeast. Out of 868 elk tagged in the Fall Creek EHU from 1979-2001, 23 elk (2.6%) were harvested in the Afton EHU. These were primarily in the Little Greys River watershed (*also see* Population Estimate, above).

Tag returns from 2000-2003 give an indication of the amount of movement within the Afton EHU itself. Tagging data indicate that the majority of elk trapped and tagged at the Forest Park feedground (HA 90) are harvested within the HA (Figure 9). Elk tagged at the Greys River feedground (HA 88), however, are most often harvested farther up the Greys River watershed in HA 89.

Table 2. Known harvest locations of elk trapped and tagged in the Afton EHU, 1976-2003. From 1971-2003, 3,191 elk were trapped and tagged.

Location of Harvest	# of Tagged Elk Harvested	% of Tag Returns	% of All Tagged Elk
Afton EHU	406	92.7	12.7
Fall Creek EHU	9	2.1	0.3
Piney EHU	8	1.8	0.3
State of Idaho	8	1.8	0.3
Hoback EHU	4	0.9	0.1
West Green River EHU	3	0.7	0.1
	n = 438		*n* = 3191

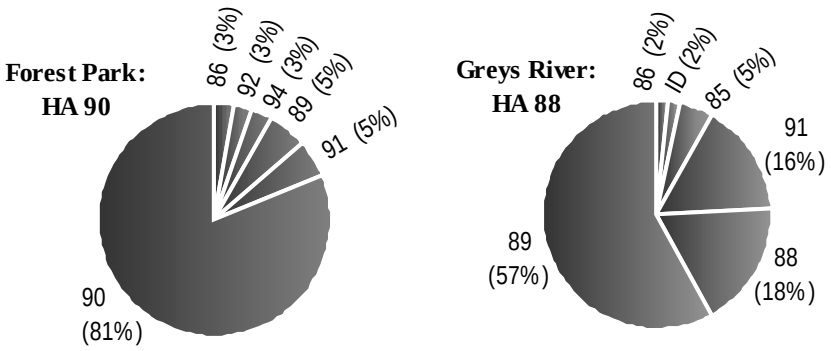

Figure 9. Known harvest locations of elk trapped and tagged at Afton EHU feedgrounds (*n* = 37 elk from Forest Park, 62 from Greys River) by elk Hunt Areas, 2000-2003.

C. Feedground Management

The two feedgrounds in the Afton EHU have very little in common. Forest Park is the most inaccessible of all feedgrounds during the winter while Greys River is the most accessible. The Greys River feedground serves to prevent damage, prevent starvation, and keep elk away from Highway 89. Forest Park serves only to prevent starvation of elk in the upper Greys River.

The Afton EHU has fewer elk than most other herd units (Figure 10). About 10% of all elk in the Jackson-Pinedale Region are fed in this EHU; about 10% of the total feeding cost of elk in the Region occurs here. The cost of feeding an elk for the winter ($55.04) in the Afton EHU is very close to the average for all EHUs ($54.58).

The number of elk on the Greys River and Forest Park feedgrounds tends to grow fairly rapidly in the early winter (Figure 10). Elk generally begin leaving these feedgrounds in March, but movements to native ranges in the spring are gradual. This is probably due to the limited amount of native range near these feedgrounds. The length of feeding for these feedgrounds (Greys River: 133 days, Forest Park: 134 days) is above the average for all feedgrounds (110 days).

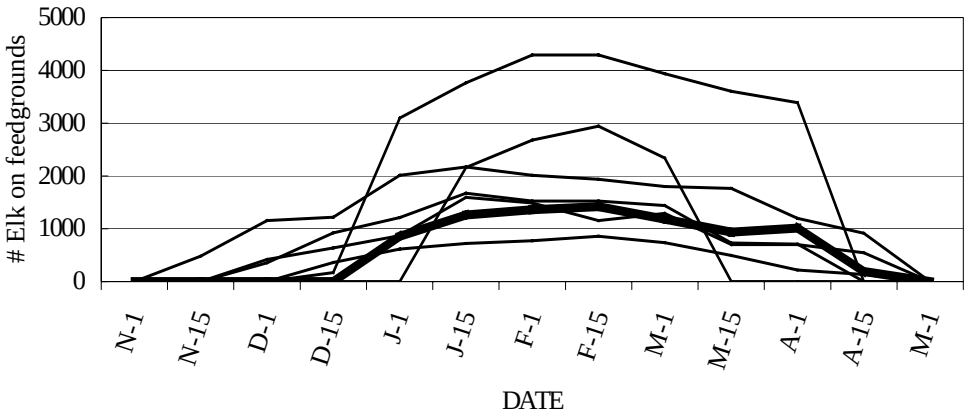

Figure 10. Length of feeding season and number of elk on feedgrounds, for the Afton EHU (bold line) and the other herd units in the Jackson/Pinedale Region during the winter of 2004-05.

Greys River

Elk are present on or near the Greys River feedground throughout the year. Snow drives additional elk to the area in the early winter. Elk numbers increase until the forage on the feedground is eaten or snow depths prevent adequate availability. At that point, elk will begin wandering north around the elk fence and get on the highway or move south where they could potentially cause damage. Either or both of these factors initiate feeding (*also see* Feedground Operation Plans, below, for discussion of factors that trigger feeding). The average starting date of the feeding season is December 11th. The average length of the feeding season is 133 days (Table 3; Figure 11).

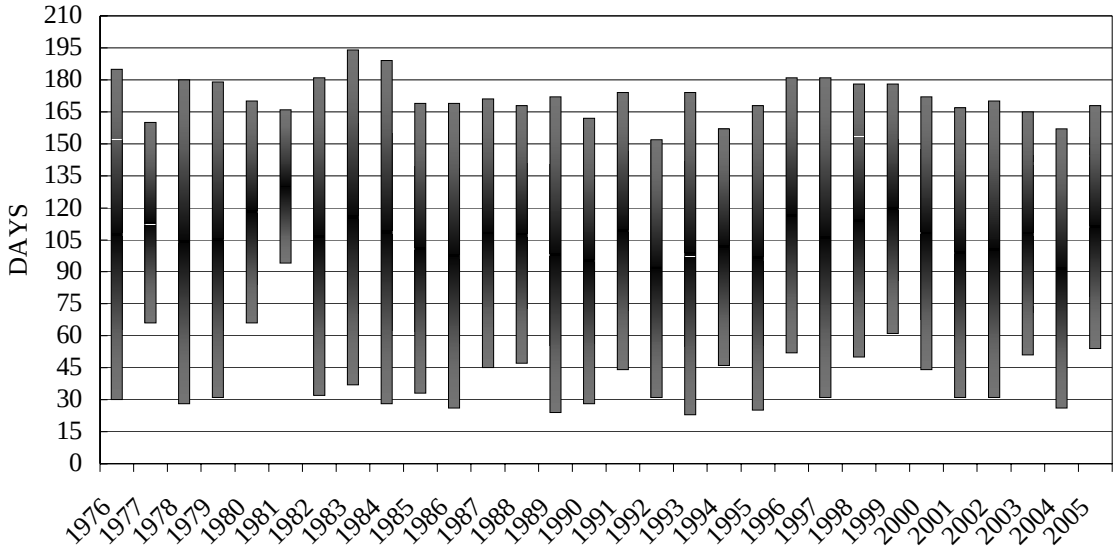

Figure 11. Beginning date, ending date, and days fed at Greys River feedground since 1975-76 (0 on y axis = November 1st).

In 2004-05, the number of elk at the Greys River feedground (602) declined 208 elk from the previous winter (Table 3; Figure 7), which was probably the result of the mild winter. This was the least number of elk counted since the very mild winter of 1980-81 and was about 400 elk below the Commission ceiling of 1,000 elk. There were 657 elk counted on the feedground in the winter of 2005-06.

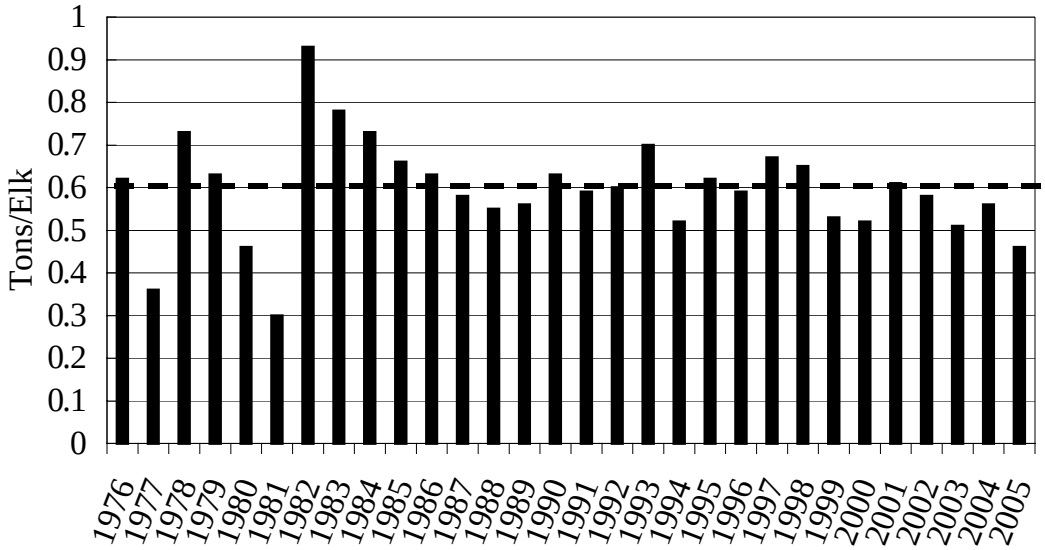

Figure 12. Tons of feed per elk per year at the Alpine feedground since 1975-76. The dashed line indicates the long-term average.

The elk were fed an average of 0.46 ton/elk over the winter of 2004-05 (Figure 12). This was the least amount fed since the mild winter of 1980-81 (Table 3). The smaller amount fed and the shorter feeding season resulted in a reduced cost per elk ($51.18). This was the lowest cost in the past 5 years and one of lowest in the past 16 years (Table 3).

Twelve elk died on the feedground during the 2004-05 winter, which was the most in the past 9 years (Table 3). Seven of these were calves that died following brucellosis surveillance trapping operations.

Table 3. Summary data from the Greys River feedground since 1975-76.

Year	# Elk	Tons Fed	Days	# Dead	Cost/Elk ($)	Tons/Elk
1975-76	925	573	156	11	33	0.62
1976-77	450	161	94	2	27	0.36
1977-78	850	623	154	5	39	0.73
1978-79	850	537	150	6	34	0.63
1979-80	800	372	106	8	28	0.46
1980-81	430	131	74	2	24	0.3
1981-82	720	671	149	7	60	0.93
1982-83	650	507	158	4	56	0.78
1983-84	830	605	166	16	50	0.73
1984-85	830	550	137	17	48	0.66
1985-86	947	593	144	14	48	0.63
1986-87	716	414	127	5	45	0.58
1987-88	1000	545	119	5	40	0.55
1988-89	1200	672	149	31	46	0.56
1989-90	933	591	135	8	63	0.63
1990-91	885	526	131	9	53	0.59
1991-92	954	568	136	7	51	0.6
1992-93	980	683	153	13	64	0.7
1993-94	906	470	111	1	37	0.52
1994-95	1100	683	145	18	57	0.62
1995-96	916	537	130	17	55	0.59
1996-97	980	654	151	9	66	0.67
1997-98	900	508	128	9	81	0.65
1998-99	880	462	118	7	52	0.53
1999-00	840	439	129	3	43	0.52
2000-01	740	448	137	3	63	0.61
2001-02	806	470	140	8	78	0.58
2002-03	663	341	115	2	62	0.51
2003-04	810	452	134	8	62	0.56
2004-05	602	276	114	12	51	0.46
Average	836	502	133	9	51	0.6

Forest Park

Feeding began on December 26th the winter of 2004-05. Only in the first years of the feedground has feeding started later (Figure 13; *also see* Feedground Operation Plans for discussion of factors that trigger feeding). Feeding ended on April 11th, which is 8 days earlier than the long-term average. Overall, the elk were fed 27 days less than the long-term average of 134 days (Table 4). This was the shortest feeding season since the very mild winter of 1980-81.

Counts indicated that 819 elk were fed in 2004-05 (Table 4). This number is an increase over the previous two winters, and given the mild winter, further increases in the number of elk on the feedground can be expected in future years when snow conditions are closer to normal. As expected, another increase was observed during counts the winter of 2005-06 (n = 919). The number on feed in 2005-06 was 169 over the Commission ceiling of 750 elk. Two elk died on the feedground in 2004-05 (Table 4), one of which was an old cow, plus a calf (cause not reported). This is the least number to die on the feedground since wolves appeared in the area. Wolves did not prey on feedground elk during the winter of 2004-05.

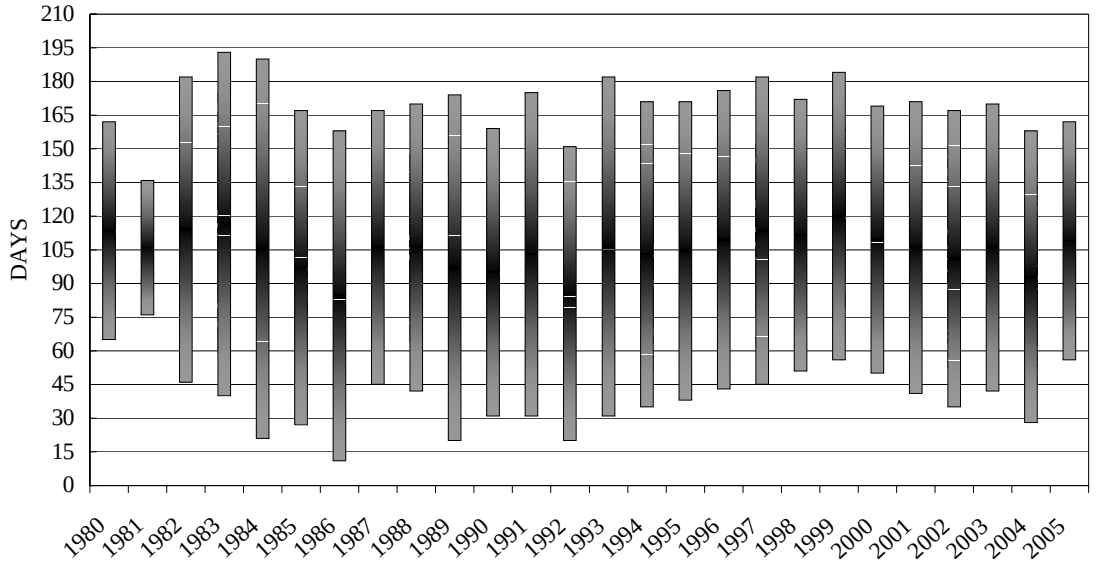

Figure 13. Beginning date, ending date, and days fed at Forest Park feedground since 1979-80 (0 on y axis = November 1st).

The amount of hay fed in 2004-05 (350 tons) was the lowest since 1987-88 (Table 4) and is associated with the very short feeding season. Each elk was offered 0.43 ton (Figure 14), which is least amount fed per elk on this feedground since the first two years the feedground was in existence. Associated with the reduced amount of hay fed, the cost per elk fed was also reduced (Table 4).

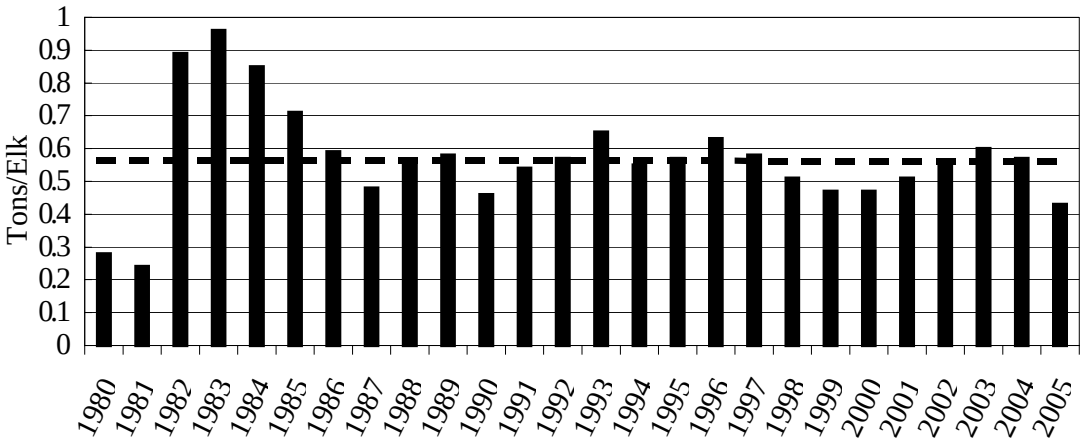

Figure 14. Tons of feed per elk per year at the Forest Park feedground since 1979-80. The dashed line indicates the long-term average.

Table 4. Summary data from the Forest Park feedground since 1979-80, when Forest Park became a permanent feedground.

Year	# Elk	Tons Fed	Days	# Dead	Cost/Elk ($)	Tons/Elk
1979-80	379	107	122	1	22	0.28
1980-81	38	9	60	0	18	0.24
1981-82	300	267	136	9	73	0.89
1982-83	250	239	156	3	86	0.96
1983-84	440	374	172	12	72	0.85
1984-85	450	318	143	1	63	0.71
1985-86	550	323	165	1	51	0.59
1986-87	550	266	125	1	44	0.48
1987-88	625	347	130	5	49	0.56
1988-89	800	462	155	4	51	0.58
1989-90	885	410	130	3	52	0.46
1990-91	950	517	145	2	55	0.54
1991-92	850	483	132	5	56	0.57
1992-93	950	613	154	5	65	0.65
1993-94	760	419	137	2	52	0.55
1994-95	790	451	134	5	57	0.57
1995-96	720	450	135	5	65	0.63
1996-97	806	465	137	9	66	0.58
1997-98	1050	492	122	1	69	0.51
1998-99	1091	517	129	3	51	0.47
1999-00	976	462	120	3	49	0.47
2000-01	929	478	131	2	56	0.51
2001-02	883	490	133	18	76	0.55
2002-03	681	411	129	7	75	0.6
2003-04	771	442	132	9	68	0.57
2004-05	819	350	107	2	58	0.43
Average	**703**	**391**	**134**	**5**	**58**	**0.57**

Feedground Operational Goals

On April 2, 1997, the Director of the WGFD issued a statement identifying feedground management goals:

1. Provide nutritional supplement to wintering elk that frequent elk feedgrounds
2. Prevent where possible, the co-mingling of elk on cattle and horse feedlines
3. Control brucellosis within elk on feedgrounds by vaccination
4. Minimize other damage conflicts on private lands

These directives do not differ greatly from the Jackson/Pinedale Region's existing long-term goals. Long-term objectives are to supplement the winter diet of elk in a manner that prevents excessive starvation, reduces risk of disease transmission to domestic livestock, and/or helps prevent damage to private property. Concurrently while accomplishing these objectives, opportunities to minimize the dependency of elk on supplemental feed have been taken.

Several management decisions must be made annually on each feedground. Depending on the situation, some may be implemented and others may not. Some are in direct contrast with others and those given preference depend upon individual situations. The following are issues that should be considered at each feedground.

1. Can the dependency of elk on supplemental feed be reduced? Even though other issues may be given preference, reducing the dependency on feedgrounds should be considered when making all decisions regarding the operation of the feedgrounds. Reducing the length of the feeding season may reduce the spread of disease and will reduce feeding costs.
2. Does the feedground assist in preventing damage/co-mingling? Feeding elk is an effective method of keeping elk from private property.
3. What can be done to keep feedground operating costs as low as possible? The amount of hay fed (influenced primarily by amount fed daily and the length of the feeding season) represents most of the cost to the feedground program. Any reduction in the amount of hay fed decreases the cost of the program.
4. How to feed in a manner that provides the most sanitary conditions? This usually involves keeping the feedgrounds as large as possible and feeding on fresh snow as much as possible.
5. Attempt to feed just enough to keep the elk in good body condition, but not low enough to compromise damage concerns. This level of feeding is less than what the elk can and will consume if offered more. Feeding should not be adjusted to attempt to keep old and/or crippled elk alive. A good rule of thumb is to feed enough to keep calves healthy for the first part of the winter, and then feed enough to keep pregnant cows in good nutritional condition during the later part of the winter. It is these two age groups (calves on the feedground and those that will be born in the spring) that are most susceptible to reduced nutrient intake.
6. Attempt to feed at rate that will satisfy the elk's appetite when the potential damage problems exist. This feeding rate is basically feeding "all they will eat" and is in excess of the physiological need of the animals, but the additional feed will keep the elk from wandering in search of more food (thus reducing the possibility of causing damage).

Feedground Operational Plans

Following the termination of the original feedground management plans in 1997 regional wildlife management personnel developed and adopted management plans in 2001 that allowed more flexibility in addressing co-mingling/damage issues. These plans need to be modified to incorporate the brucellosis management strategies included in the main body of this document.

Greys River

This feedground sets on Game and Fish property and is adjacent to Highway 89 near Alpine, Wyoming. The feedground was formally called "Greys River" even though it has been located in the Salt River drainage for more than 50 years. Commission quotas allow 1000 elk to be fed at this site.

The Alpine Feedground is the most accessible of all feedgrounds. A "pull out" exists along the highway where people can view the elk at close range (sometimes within 30 yards when the elk are fed near the highway). Elk migrate to this site from many locations, including the Snake River Canyon, Indian Creek (Idaho), Salt River, Little Greys River, and Greys River. Before arriving at the feedground, many elk pass through or near the Town of Alpine, cross Highway 89/26, and cross the ice on Palisades Reservoir/Snake River. An elk proof fence runs about 11 miles to the south and about ½ mile to the north of the feedground. This fence acts to encourage elk to move to the feedground rather entering private property and causing damage. Some elk get below the fence each year and will invariably cause damage problems.

Primary Management Issues

1. The elk fence must be in good repair and gates kept closed in order to keep elk above the fence and away from livestock and private holdings.
2. This site has been used by the Department to gather research information on elk for more than 30 years. Some of the best data relating disease incidence comes from this feedground. It is important that these elk be made available for study.
3. The feedground is important in reducing damage to private property and elk/vehicle accidents.

Secondary Management Issues

1. This is a highly visible feedground and part of the public's perception of the Department's feedground management capabilities results from what they observe at this location. For this reason, how the Department manages this feedground can serve to educate the public or it can result in public criticism.
2. Because of its close proximity to the highway and homes, several problem situations may occur each year. These include dogs on the feedground, antler hunters on the feedground, people walking on the feedground to take photos, occasional poaching (very rare), gate left open and GF horses on the highway, and home owners needing access to their water development (which sets on the feedground). While these situations are of concern, frustrating at times, and must be dealt with, none of them happen with enough regularity that they cause significant problems.

Management Suggestions/criteria

1. Elk migrate to the feedground as snow depths increase in the fall and early winter. These elk will use the native forage on and near the feedground for a while. At some point they will begin moving farther and farther from the feedground and eventually begin getting on the highway near the Town of Alpine and/or will move to the south. It is at this time that feeding should begin.
2. Feeding can be terminated in the spring as the elk begin leaving the area. Feeding sometimes lasts longer here than on other feedgrounds. Much of the area near the feedground does not have a lot of south slopes that bare off early and offer residual and/or new growth. Also, the proximity of the feedground to the highway also delays the termination of feeding because if several hundred elk remain on the feedground after feeding ceases, the Department is perceived as not caring for the elk. Feeding a few days longer than necessary in the spring will prevent this type of criticism.

Forest Park

Historically, elk that wintered along the middle and upper portion of the Greys River were susceptible to relatively high levels of natural winter mortality. This segment of the elk herd apparently did not migrate from the Greys River/Forest Park area. With the increased use of over-snow vehicles into the upper Greys River in the mid to late 1960s, the public became more aware of high winter mortality of elk that wintered near Forest Park. Consequently, the Wyoming Game and Fish Department submitted a special use application to the Greys River Ranger District, and approval of this special-use application by the Forest Service formally established the Forest Park elk feedground in April 1979. This is the last feedground to be established by the Department. Commission quotas allow 750 elk to be fed at this location.

Primary Management Issues

1. This is one of two feedgrounds (Green River Lakes being the other) where damage issues do not drive feedground management decisions. The sole purpose of this feedground is to reduce winter starvation in the Upper Greys River area. Migrating elk will come to the feedground as snow depths increase and stay in the vicinity of the feedground. Feeding needs to begin before these elk “give up” and move down the river in search of food. This is a subjective judgment, but the concern does exist that, if not fed soon enough, several hundred elk may migrate down drainage and either starve to death or compete with other elk that free range on the south end of the Middle Ridge.

Secondary Management Issues

1. The feeder at Forest Park is the most isolated of any feeder and is probably one of the most isolated persons in the entire State during the winter months. This site sets about 34 miles from the end of the plowed road. Some snowmachine activity occurs in this area but these machines are not allowed within ½ mile of the feedground. There is not a telephone at the site and radio/cell phone reception can be poor at best. The point is that feeder may be unable to contact the outside world and a simple injury or illness could become life threatening. The USFS has

allowed feeder to use one of their radios, which has been extremely useful. The Department needs to discuss this situation with the feeder and decide how contacts with others can be made, particularly during emergencies.
2. The Cabin at the site is heated by wood stove and the feeder needs to have firewood available.

Management suggestions/criteria

1. A maximum amount of hay should be stored at this location to reduce the chance of running out.
2. Feeding should be initiated when snow depths get around 18 inches and/or the elk show signs of migrating down drainage.
3. Feeding in the spring can be terminated when south slopes are void enough of snow that adequate residual/new growth is available to the elk.

D. Brucellosis Management Summary

The WGFD developed an integrated program in an attempt to manage brucellosis in free-ranging elk associated with feedgrounds in the late 1980s. This approach, called the Brucellosis-Feedground-Habitat (BFH) Program, combines five ongoing management activities: feedground elk vaccination, feedground management, habitat enhancement, elk/cattle separation, and brucellosis education. Goals established in 1989 were to: maintain spatial and/or temporal separation of elk and cattle during brucellosis transmission risk periods, reduce prevalence of brucellosis in elk through vaccination and habitat improvements, and work with all affected interests in trying to eliminate brucellosis in the GYA.

To address these goals, BFH and other WGFD personnel conduct the following activities.

Vaccination

Vaccination on the Greys River feedground is the longest running strain-19 program on any feedground, having been initiated in 1985. From 1985 to 1989 juvenile coverage averaged 96%. In the 1990s, 99% of all juveniles were vaccinated and in the 2000s, 100%. A total of 4,205 juveniles and 1,449 adult females have been vaccinated on the Greys River feedground since 1985. Vaccination was initiated on the Forest Park feedground in 1988. Since that time, a total of 3,753 juveniles and 715 adult females have been vaccinated (Table 5).

Table 5. 1998-2006 vaccination summary for Forest Park and Greys River feedgrounds.

		Classification			Calves Vaccinated	
Year	Feedground	Calves	Females	Total Elk	Number	% of Classified*
1998	Forest Park	231	571	973	270	>100%
1998	Greys River	178	518	783	169	95%
1999	Forest Park	255	641	1091	246	96%
1999	Greys River	189	599	878	185	98%
2000	Forest Park	156	632	976	170	>100%
2000	Greys River	122	593	810	129	>100%
2001	Forest Park	205	545	929	209	>100%
2001	Greys River	121	524	737	117	97%
2002	Forest Park	171	562	883	173	>100%
2002	Greys River	166	534	806	167	>100%
2003	Forest Park	115	472	681	125	>100%
2003	Greys River	133	451	663	133	100%
2004	Forest Park	170	483	810	170	100%
2004	Greys River	168	543	771	172	>100%
2005	Forest Park	160	561	819	160	100%
2005	Greys River	161	397	602	169	>100%
2006	Forest Park	229	542	919	242	>100%
2006	Greys River	154	430	657	153	99%

* >100% coverage suggests some yearlings may have received S19 dose.

Serology

The WGFD initiated brucellosis surveillance of elk on the Greys River feedground and NER in 1971 to monitor the distribution and prevalence of the disease. Currently, BFH and other WGFD personnel trap, bleed, and test elk on 4 to 6 feedgrounds annually. Several thousand (4,272) yearling and adult female elk trapped on 21 different feedgrounds have been tested to date. Elk on Forest Park feedground were tested annually from 1982 through 1986, then again in 2001 and 2002. Greys River feedground elk have been trapped and tested almost annually since 1971 (Table 6).

Four tests are used to evaluate elk sera; the standard plate agglutination test (SPT), the buffered *Brucella* antigen rapid card test (BBA), the rivanol precipitation-plate agglutination test (RIV), and the complement fixation test (CF). Seroprevalence is determined using procedures published in USDA-APHIS, 1998. Sera that produce a reaction on two or more tests, or if the CF test alone shows a reaction at a dilution rate of 2+ 1:20 or higher, are considered positive. Once serostatus is determined using these criteria, the cELISA (competitive enzyme-linked immunosorbent assay) is conducted on positive sera to differentiate between Strain 19 vaccine and field strain *Brucella abortus* titers. Seroprevalence indicates the animal has been exposed to *Brucella* and has formed an antibody response, but does not determine presence (or infection) of *Brucella* within the animal.

Dell Creek feedground is the only state operated feedground where elk vaccination is not conducted. Distribution data of elk from this feedground suggest little interchange with surrounding feedgrounds, thus providing a suitable control to compare elk vaccination efficacy with other feedgrounds. Brucellosis surveillance was initiated on Dell Creek in 1989, and has since been conducted from 1998-2004. Serology data using cELISA (Table 7) indicate *Brucella* seroprevalence averages 29% (+/- 13.8) on Dell Creek, and has fluctuated from 8% in 2004 to 50% in 1999. Seroprevalence on Forest Park averages 30% (+/- 4.9), and the mean rate of Greys River elk is 27% (+/- 20.4)(Table 6). More data are needed on all feedgrounds to more accurately assess efficacy of the Strain 19 vaccination program.

Table 6. Number of yearling, adult, total female, and % seroprevalence of elk tested on Greys River and Forest Park feedgrounds as determined by 4 standard tests and cELISA.

		# Tested			% Seroprevalence	
Feedground	**Year**	**Yearling**	**Adult**	**Total**	**4 Standard**	**cELISA**
Forest Park	1982	3	28	31	16%	*
	1983	11	20	31	0%	*
	1984	9	33	42	5%	*
	1985	0	7	7	71%	*
	1986	10	10	20	25%	*
	2001	9	18	27	44%	26%
	2002	21	28	49	33%	33%
	Sum	**63**	**144**	**207**	**22%**	**30%**
Greys River	1971	17	29	46	26%	*
	1973	15	56	71	48%	*
	1974	5	45	50	48%	*
	1975	2	2	4	75%	*
	1976	7	29	36	67%	*
	1978	3	10	13	38%	*
	1979	0	7	7	43%	*
	1980	6	13	19	47%	*
	1982	8	10	18	44%	*
	1983	7	4	11	18%	*
	1984	6	13	19	5%	*
	1993	13	34	47	30%	11%
	1994	6	18	24	21%	0%
	1995	19	28	47	17%	13%
	1996	16	17	33	12%	9%
	1997	14	24	38	26%	3%
	1998	12	31	43	33%	14%
	1999	6	29	35	17%	9%
	2000	17	21	38	45%	26%
	2001	12	25	37	62%	54%
	2002	10	32	42	55%	50%
	2003	17	38	55	56%	51%
	2004	8	31	39	29%	59%
	2005	16	53	69	29%	29%
	2006	2	22	24	38%	29%
	Sum	**244**	**621**	**865**	**35%**	**27%**

* cELISA test not conducted

Table 7. Yearly and total seroprevalence (%) as determined by the cELISA test on Dell Creek, Greys River, and Forest Park feedgrounds.

Year	Dell Creek*	Greys River	Forest Park
1993		11	
1994		0	
1995		13	
1996		9	
1997		3	
1998	26	14	
1999	50	9	
2000	45	26	
2001	26	54	26
2002	35	50	33
2003	37	51	
2004	8	59	
2005	18	29	
2006	17	29	
Total	**29%**	**27%**	**30%**

*Dell Creek is a control and has never been vaccinated

Elk/Cattle Disease Transmission Reduction

Annually, WGFD personnel employ a variety of damage control techniques to maintain spatial and temporal separation of elk and cattle. The WGFD has a long-standing practice of providing game-proof stackyard fencing to private producers to prevent elk from depredating privately owned stored hay crops and to discourage elk from frequenting cattle feeding areas. By preventing elk from establishing feeding patterns in cattle wintering areas, the potential for interspecific brucellosis transmission may be diminished. Since 1992, elk-proof fencing materials for 173 haystacks (as of May 2006) have been provided by WGFD personnel to cattle producers in Lincoln, Sublette, and Teton counties in western Wyoming. Since the fall of 2002, WGFD personnel have distributed materials for at least six permanent stackyards in the Star Valley.

In some instances, elk are hazed from cattle feeding sites. These animals are removed from areas of conflict via snowmobiles or aircraft to WGFD feedgrounds. In other cases, when the aforementioned management actions fail to achieve desired results, special depredation hunting seasons or kill permits are employed to remove problem animals (*also see* section A: Damage History).

Since 1999, BFH personnel have monitored areas where elk parturition and cattle turn-out dates overlap (Figure 15). During the elk calving period from late May to mid June, a potential risk of brucellosis transmission to cattle on overlapping ranges exists. Twelve public land grazing allotments in 3 counties have been identified as potential risk areas. Eleven of 12 risk areas showed no elk/cattle interaction from 1999-2003. Coordination and education efforts with land managers and grazing operators will be initiated to resolve elk/cattle interaction if and when conflict areas are identified.

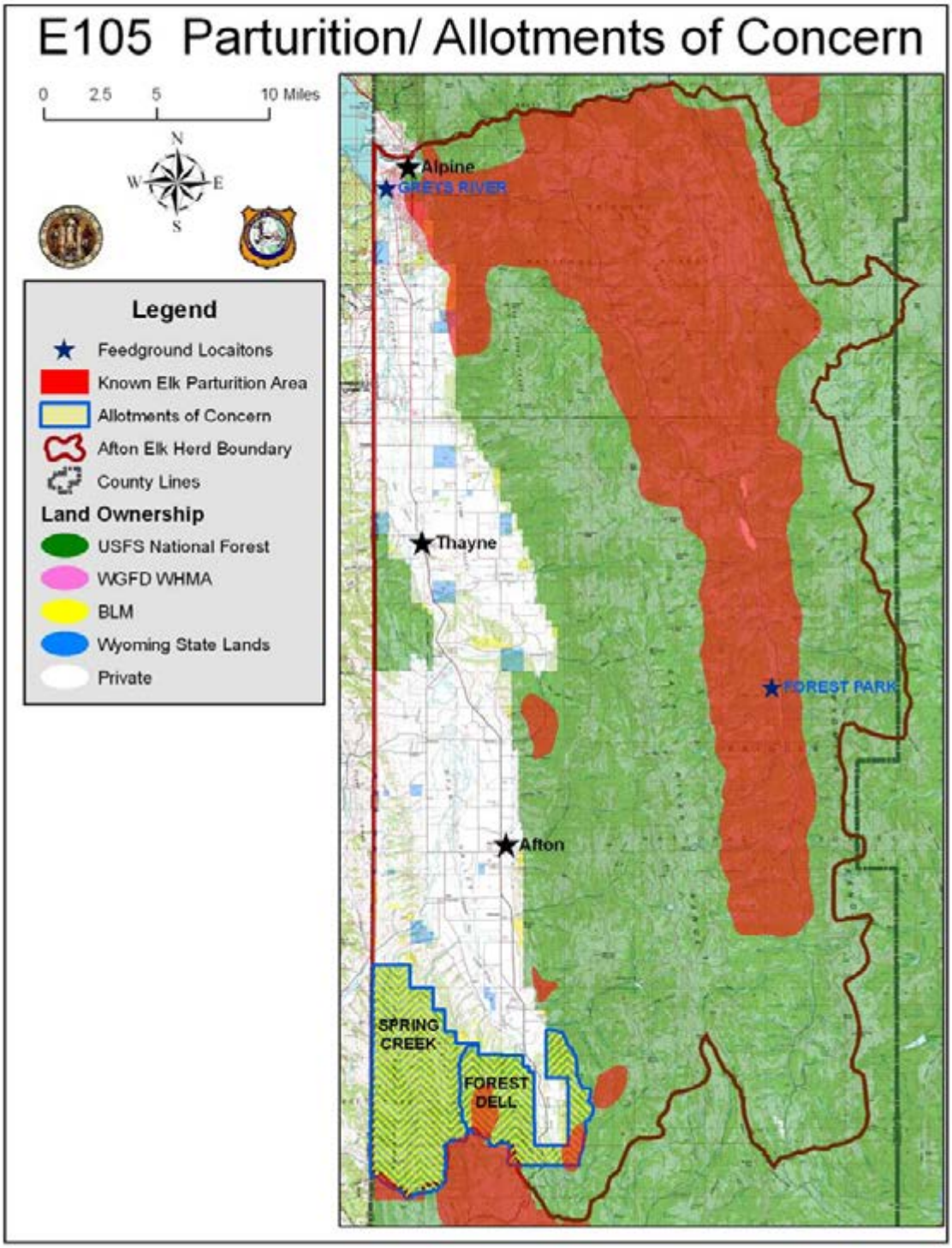

Figure 15. Elk parturition areas and overlap with public-land cattle-grazing allotments (prior to June 15) in the Afton EHU.

E. Habitat Management

A primary goal of the *habitat* portion of the BFH program is to enhance transitional and winter elk habitat to potentially minimize the transmission and prevalence of brucellosis in elk associated with feedgrounds. Manipulating decadent vegetation can increase the production and palatability of grasses. If habitat improvements are completed near feedgrounds or between summer range and feedgrounds, the enhanced forage produced will decrease the dependence of elk on artificial feed, snow conditions permitting. Reduced feeding durations and lower elk concentrations on feedgrounds, especially during the high transmission risk period, may decrease the probability of intraspecific brucellosis transmission events. Habitat enhancement projects also create vegetative diversity, enhance aspen communities, and improve range conditions for a myriad of species.

Habitat enhancement projects can be employed to mimic natural disturbances and restore habitat to a more properly functioning condition. BFH biologists work with WGFD Habitat biologists, Wildlife biologists, and other agencies to implement habitat enhancement projects that improve elk transitional and winter ranges as well as habitat for many other wildlife species. These projects involve identification of treatment areas, habitat inventory, implementation, and post-treatment monitoring.

Numerous habitat improvement techniques can be utilized to increase habitat quantity and quality. These methods involve manipulating vegetation to create a mosaic of multi-aged plant communities across the landscape. The most commonly used habitat enhancement techniques include prescribed fire, mechanical treatments, and herbicide application.

Several habitat enhancement projects have occurred within the Afton EHU on elk winter and transitional ranges (Figures 17 and 18). Treatments that target improvements to spring ranges and reduce the number of elk fed and dependency on feed during the 3rd trimester of pregnancy should theoretically reduce the risk of brucellosis transmission.

BFH biologists and Habitat biologists conduct vegetation monitoring to evaluate success of treatments in meeting objectives, and gain knowledge useful in planning future projects. Permanent plots are established to collect attributes of habitat quality and monitor post-treatment vegetation responses. Ideally, data from a plot located in a treated area (e.g., prescribed fire) are compared with data from an untreated ("control") area to detect vegetative changes. If a control plot is not established, data collected from the treated site during different years provide temporally comparative information. Data collected from plots include one or several of the following: cover, shrub/tree density, shrub/tree age structure, forage production, species diversity, and photographs. In addition, elk use patterns in relation to treatments are monitored.

Greys River Habitat Inventory (1994-1995)

Personnel from WGFD, BTNF-Afton Ranger District, and volunteers from the public conducted habitat inventories within the Greys River drainage during the summers of 1994 and 1995. The inventories focused on important elk winter and transitional areas and were conducted as part of the WGFD's BFH program. Approximately 12,085 acres were inventoried, classified and delineated according to habitat types identified by Hironaka et al. 1983, Mueggler 1988, Steele et al. 1983, Tart 1996, and Youngblood et al.

1981. Fifty-nine different polygons were classified into the following habitat types: sagebrush (39 polygons), aspen (13), lodgepole pine and Douglas fir (3), snowberry (2) and tall forb (1). Most of these sites were restricted to southern aspects due to the focus on important elk winter and transitional ranges (Figure 16).

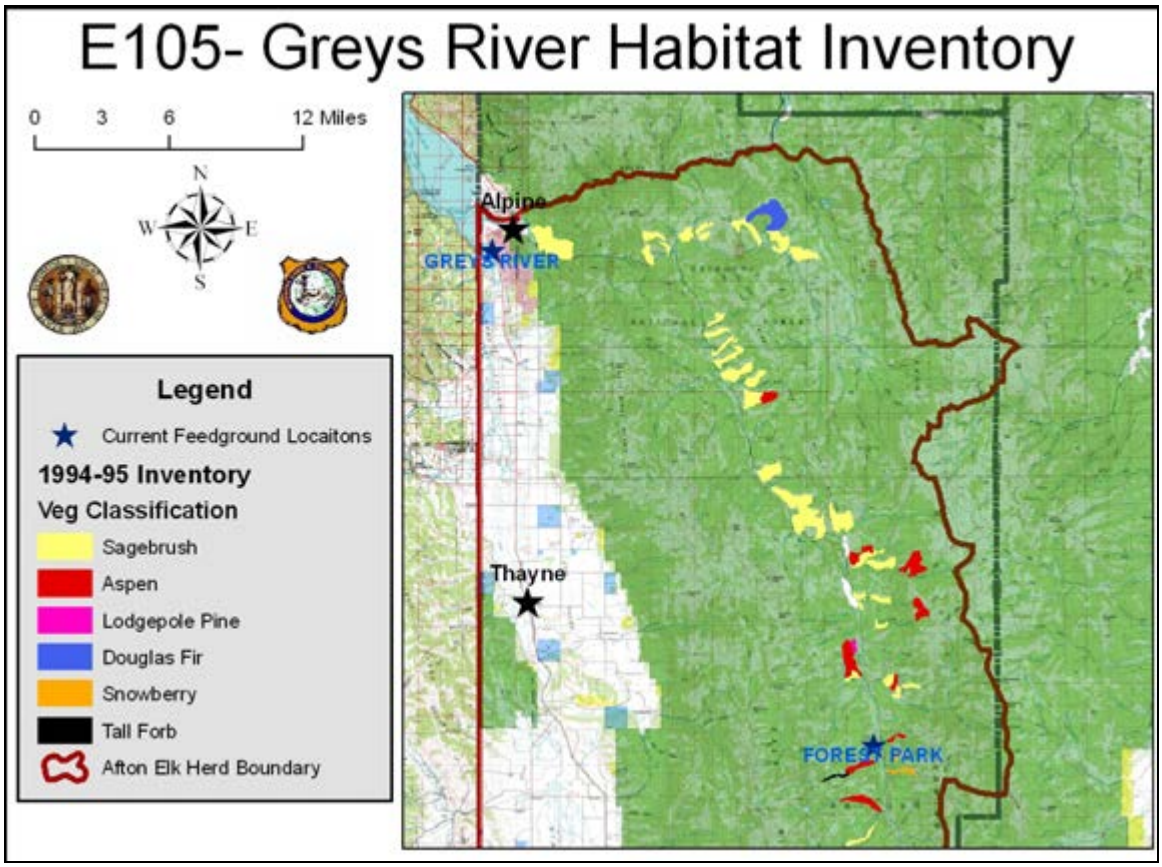

Figure 16. General location of sites inventoried during 1994-95 for enhancement of important elk winter/transitional ranges within the Greys River drainage.

In addition to habitat-type classification, inventories within polygons included the following information: 1) species composition, 2) percent cover for shrubs, grasses and forbs, 3) height and age classes for shrubs, 4) utilization levels for shrubs, and 5) ground cover. Narratives were also provided for: 1) description of polygon (vegetation, arrangement, inclusions, seral stages, ecological health, etc.), 2) animal evidence (wild and/or domestic and season of use), 3) potential and priority for treatment (including methods), and 4) fuels, access, and potential fuel breaks, pounds or ton/acre. Data collected during these inventories have been, and still are, valuable in the development of habitat enhancement plans in this area.

Implemented Habitat Projects

Blind Bull and Moose Creek Prescribed Burns

As a result of the 1994-95 Greys River habitat inventory and as a component of the Afton EHU BFH plan, proposals were developed by the WGFD to conduct prescribed burns on approximately 900 and 200 acres within the Moose Creek and Blind Bull Creek drainages, respectively.

The project sites are part of the primary winter range complex of the Greys River and annually winter 50-200 elk and 15-35 moose. The projects were intended to address the brucellosis issue through sustaining the above populations and preventing increased elk dependence on the Forest Park feedground. The burns were intended to enhance sagebrush and aspen habitats. Historic fire suppression had resulted in a lengthening of the wildfire interval beyond the natural range of variability. The lack of wildfire had resulted in a homogenous stand of decadent to dead mountain shrub communities. Dead, dying, and declining aspen stands were succeeding to Douglas fir. Primary objectives of the project were to: enhance plants species nutrition, age classes, structure and species diversity; nutritional plane, distribution and use of native winter ranges; and reduce the potential for disease transmission between elk. The site was within Desired Future Condition 12, which is designated by the BTNF Land Management Plan to be managed for "high quality wildlife habitat and escape cover, big game hunting opportunities and dispersed recreational activities" (Figure 17).

The treatments were implemented during the autumns of 1996 and 1997. The 200-acre project area in Blind Bull Creek was burned in 1996. Funding for the project was provided by RMEF ($9,066), USFS ($10,000), and the WGFD Trust Fund ($10,000). The 900-acre project area in Moose Creek was burned in 1997. RMEF ($2,500), USFS ($3,000), and the WGFD Trust Fund ($1,000) also provided the funding for that project.

Both burns were conducted under cool fall prescriptions creating a mosaic of burned and unburned vegetation. The Blind Bull burn consisted mostly of dense sagebrush stands with continuous fuels, resulting in 60-70% of the unit being treated with fire. Small pockets of aspen/conifer mix were burned, but fire did not carry through the majority of this community type. The Moose Creek prescribed burn was implemented under an even cooler burn window resulting in only 20% of the area being treated. The denser sagebrush stands carried fire well, while less dense stands and aspen communities received little to no fire. WGFD personnel recommended the project be revisited and consideration given to reentry utilizing a hotter burn window. This has not been done to date (2006).

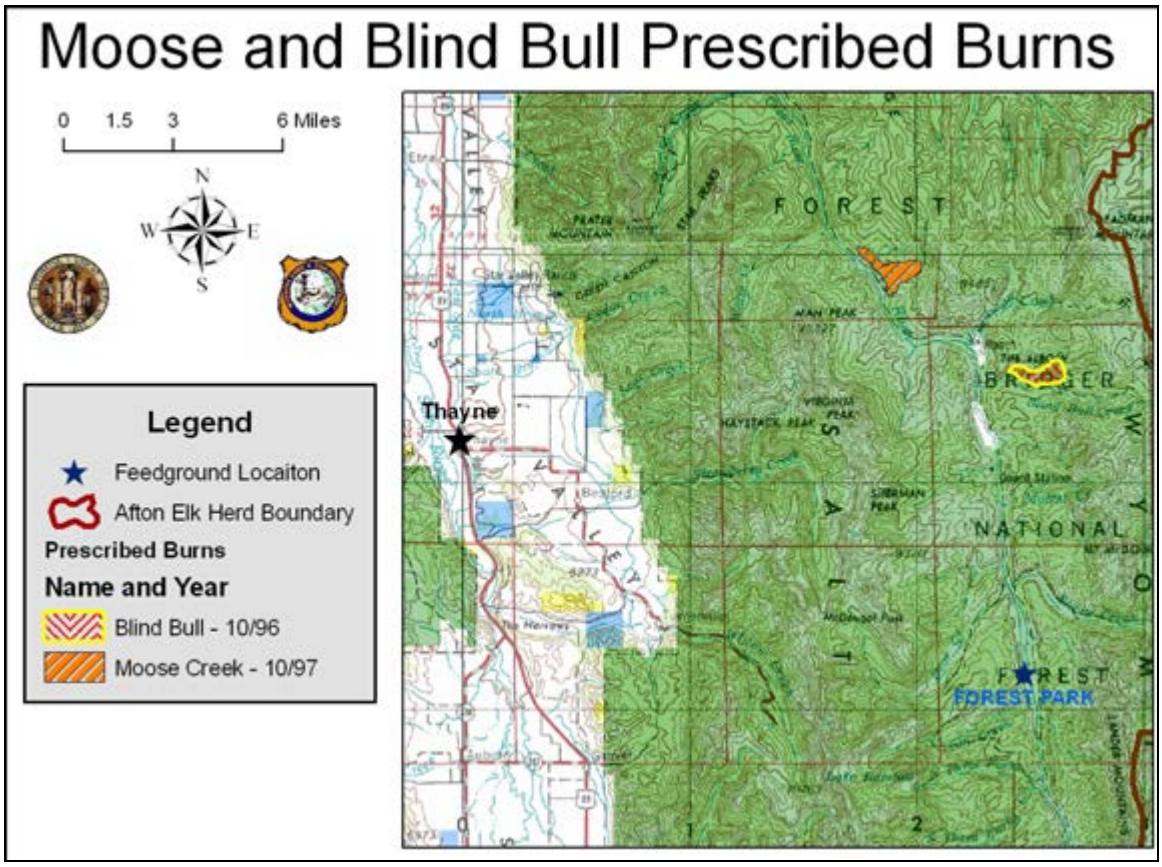

Figure 17. Blind Bull and Moose Creek prescribed burns, Greys River drainage.

Spring Creek Prescribed Burn

The WGFD, RMEF, and BTNF- Afton Ranger District partnered to implement a prescribed burn in the Spring Creek area located 8 miles south-southwest of Afton, Wyoming. The project area is located on the east side of Spring Creek between First and Second Creeks and is about 1,610 acres (Figure 18). Predominant cover types within the project area included 1,330 acres of sagebrush/ grassland, 175 acres of aspen and 105 acres of conifers. The project area provides winter and transitional range for mule deer, elk and moose. Project planning was initiated in 1993 and implementation occurred during the fall of 1995. The goals of the project were to increase herbaceous vegetative production and nutrient quality, enhance and maintain historic vegetative succession stages, reduce fuels to more normal levels and maintain/enhance overall ecological integrity of the Spring Creek drainage.

The project was tiered with the WGFD- BFH program and the Afton EHU Action Plan. It was consistent with the BTNF's Land Management Plan, Desired Future Condition 10, which places management emphasis on providing short and long-term habitat to meet the needs of wildlife managed in balance with other multiple uses. Total project costs were $47,488, with RMEF, BTNF and WGFD contributing $21,488, $22,500 and $3,500, respectively.

A permanent nested-frequency monitoring site was established and information was collected on species composition, shrub canopy cover, and ground cover pre- and

post-burn. Pre-implementation monitoring occurred in August of 1994; the prescribed burn occurred in September of 1995. Post-treatment monitoring has thus far been done in July of 1999 and August of 2004. Pre-treatment (1994) and post-treatment (1999) data have been analyzed and compared (below); post-treatment data from 2004 has not been summarized and compared to the 1994 and 1999 data sets.

Graminoid Response 1994-1999: Fourteen (14) species of graminoids were present prior to the burn and 12 species were documented within the nested frequency plot after four growing seasons post-burn. The two species not found within the sampling site in 1999 were trisetum (*Trisetum spicatum*) and oniongrass (*Melica bulbosa*). While they were not detected within the sampling plot, they were present in the immediate area. Bluebunch wheatgrass (*Agropyron spicatum*) and Junegrass (*Koleria macrantha*) had positive responses to the treatment and increased in frequency 35% and 33%, respectively. Kingspike fescue (*Leucopoa kingii*) decreased in frequency by 25%.

Shrub Response 1994-1999: Seven (7) species of shrubs were present pre-treatment and eight (8) were present after four growing seasons. Ceanothus (*Ceanothus velutinus*) and mountain lover (*Pachistima myrsinites*) were present only post-treatment. Mountain lover is generally considered "neutral" with respect to fire response. It does sprout and establish from seed after moderate fire intensity. The increase in cenaothus was expected its dormant, ground-stored seed thae requires heat treatment to germinate. It is also a nitrogen fixer and plays an important role in nitrogen reaccumulation post-burn. Canopy cover of sagebrush (*Artemesia tridentate var. pauciflora*) , antelope bitterbrush (*Purshia tridentata*), and serviceberry (*Amelanchier alnifolia*) decreased significantly post-burn.

Forb Response 1994-1999: Sixteen (16) new species were present post-burn and four species present during pre-burn monitoring were not present post-burn, resulting in a net gain of 12 new species in 1999 (Table 8). The combined changes in herbaceous and shrub species composition resulted in a 20% increase in species diversity.

Table 8. Forb species lost and gained from pre-burn (1994) to post-burn (1999) as a result of the Spring Creek prescribed fire.

Species Lost		**Species Gained**	
Common name	Scientific name	Common name	Scientific name
Stone crop	*Sedum spp.*	Weedy milkvetch	*Astragalus misere*
Yampa	*Perideridia gairdneri*	Hollyhock	*Lliamna rivularis*
Mule's ears	*Wyethia amplexicaulis*	Senecio	*Senecio resedifolius*
Clematis	*Clematis hirsutissima*	Baldhead sandwort	*Artemesia congesta*
		Thistle	*Circium spp.*
		Goat's beard	*Tragopogon dubius*
		Collomia	*Collomia linearis*
		Willow weed	*Epilobium paniculatum*
		Knotweed	*Polygonum douglasii*
		Viola	*Viola spp.*
		Wild carrot	*Lomatium spp.*
		Scarlet gilia	*Gilia aggregata*
		Stone seed	*Lithospermum ruderale*
		Penstemmon	*Penstemmon spp.*
		Toadflax	*Commandra umbellate*
		Catchfly	*Silene spp.*

Ground Cover 1994-1999: The prescribed fire resulted in ground cover frequency score changes (Table 9). Ground cover consists of vegetation, litter, rock and soil. The occurrence (nested frequency) of vegetation and litter decreased significantly while bare ground or soil increased significantly (80% probability; Chi Square = 1.642, 1 degree if freedom). The occurrence of rock did not change significantly.

Table 9. Occurrence (nested frequency) of vegetation, litter, rock and soil pre- and four years post- treatment, Spring Creek prescribed fire, 1995.

	Ground Cover Frequency	
Cover Type	**1994**	**1999**
Vegetation	23	16*
Litter	66	48*
Rock	1	5
Soil	9	31*

*significant difference at the 80% probability level; Chi-squared + 1,642 w/ 1 degree of freedom

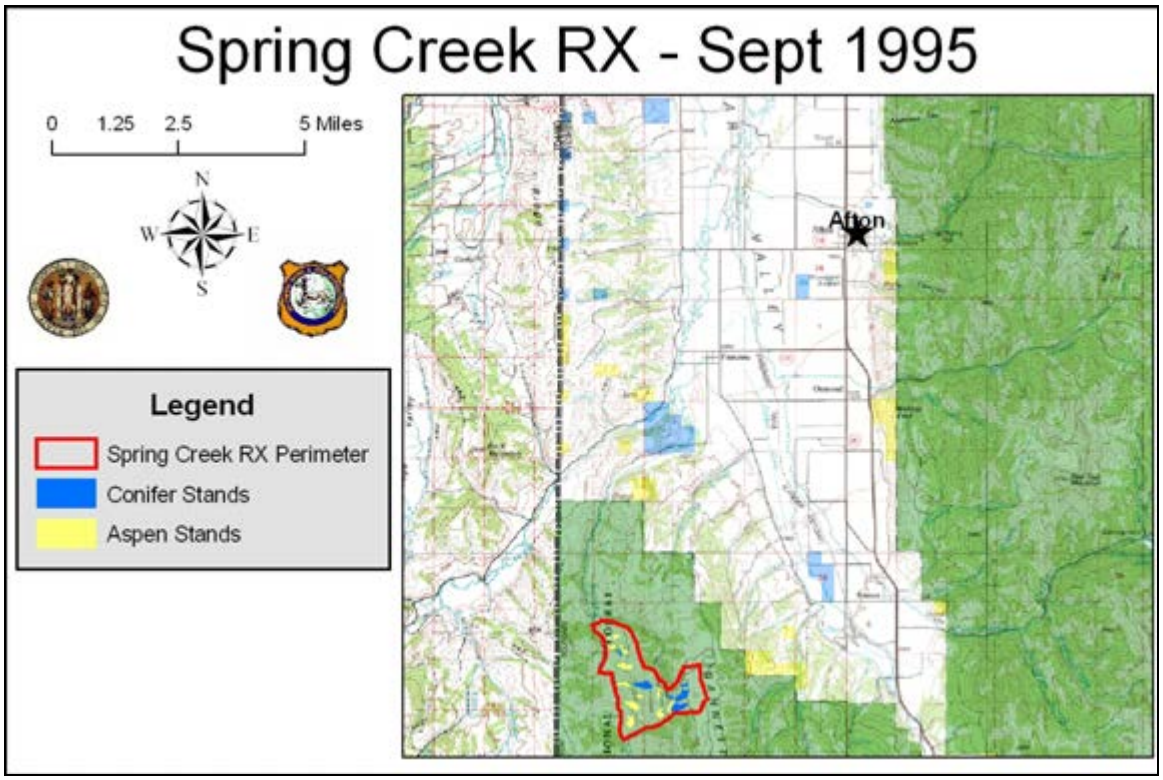

Figure 18. Location of the Spring Creek prescribed burns, implemented in September 1995.

Proposed Habitat Projects

In addition to the implemented projects, WGFD habitat and BFH biologists have collaborated with USFS-BTNF personnel on numerous planned projects within the Afton EHU that have not been implemented to date. WGFD personnel will continue collaborations with USFS personnel in pursuing implementation of the following projects.

Alpine Fuels WHMA Cutting and Burning

The Alpine Fuels Project is a partnership between WGFD, USFWS, and BTNF. This project is comprised of approximately 300 acres on the Greys River WHMA, USFWS lands administered by WGFD, and adjacent USFS land (Figure 19). The project was initially proposed to reduce risk from wildfire to people and property in Alpine due to higher density conifer stands. The plans for this project include helicopter logging of conifers followed by burning the slash and understory on both the WHMA and USFS lands. There are patches of aspen that are targeted for treatment, which will provide important wildlife forage and winter/transitional range benefits for elk, moose, mule deer and a variety of non-game wildlife species. This thinning and burning should result in increased forage production and rejuvenation of understory mountain-shrub community types. The increased forage production has the potential to serve as important transitional and winter range for elk frequenting the Greys River feedground.

The project has been in the planning phase since 2002 and is ready for implementation with helicopter logging anticipated for the 2006 or 2007 season. A prescribed burn will follow up conifer thinning the next year, after the slash has one season to cure.

Weiner Creek Prescribed Burn

The Weiner Creek prescribed burn project comprises 1580 acres of mixed aspen-conifer and sagebrush vegetation types that are in late successional stages on the BTNF (Figure 19). WGFD has partnered with the BTNF on this project because of the benefits for elk parturition and transitional range in this drainage. Late successional aspen has potential to be lost in this area if conifer densities are not decreased and the aspen treated with disturbance. This project area is almost completely on designated elk parturition range. The improved condition of aspen stands has the potential to provide long-term forage production and calving areas for elk in the Afton EHU.

The planning of this project is complete. The BTNF plans to implement this project in the fall of 2006, given an appropriate burn window for meeting vegetation objectives agreed upon by WGFD and BTNF Biologists.

Bradley Mountain Prescribed Burn

The Bradley Mountain prescribed burn project is in the early planning stages as of spring 2006. This burn project could cover up to 3400 acres of mountain-shrub, sagebrush, and aspen types in close vicinity to the Greys River Feedground on BTNF land (Figure 19). This project has the goal of setting succession back and increasing forage production for wildlife benefit. The majority of this project area is in designated

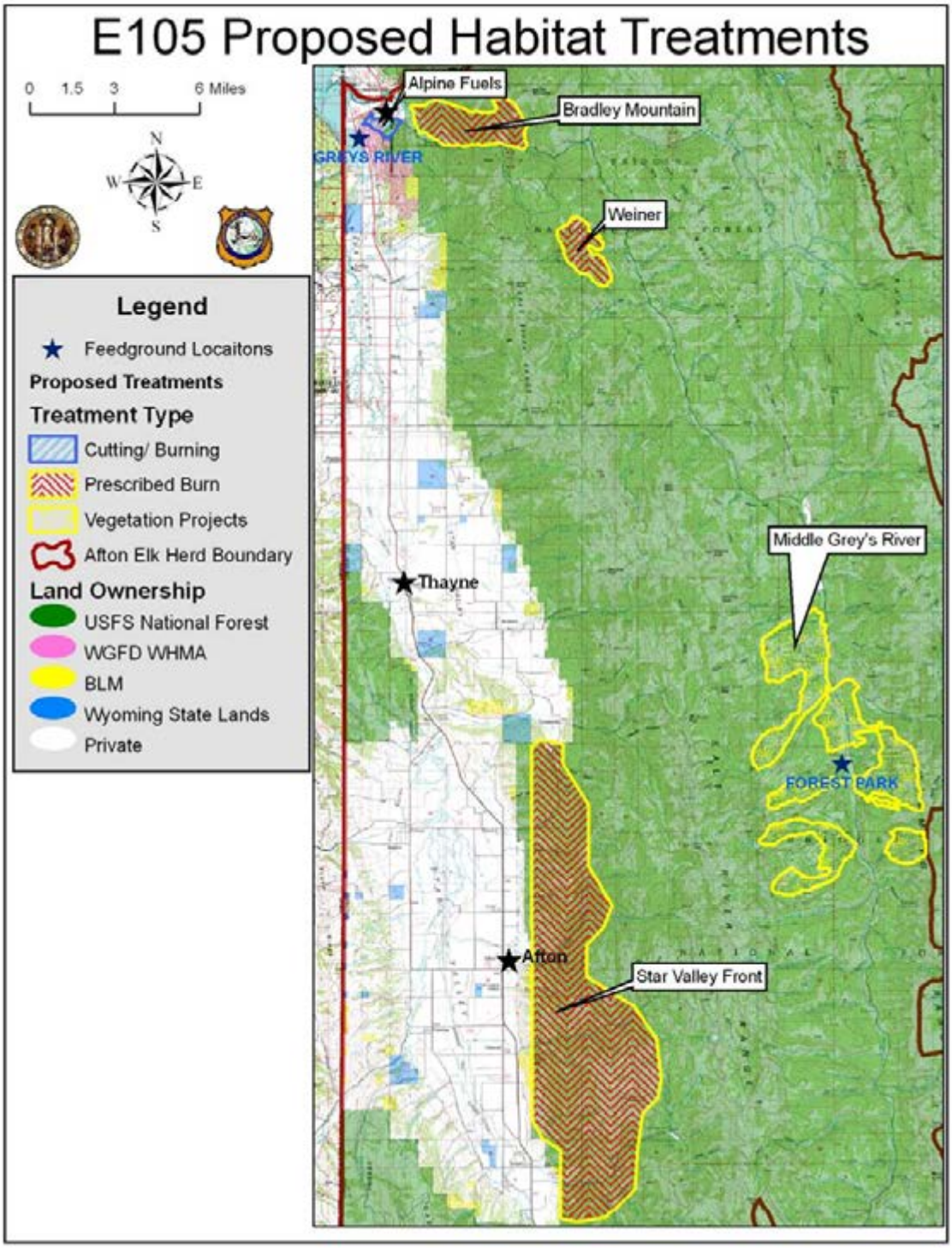

Figure 19. Areas of anticipated habitat treatments in the Afton EHU.

elk parturition range. The planning will continue with vegetation mapping, setting vegetation objectives, and writing a burn plan over the course of the next year between WGFD and BTNF biologists and fire personnel. We anticipate this burn will be implemented in the fall of 2006 or 2007.

Middle Greys Vegetation Projects

BTNF and WGFD biologists have delineated this area as a high priority for vegetation treatments. There are several burn project areas being considered in this larger resource management area. Up to 12,600 acres have been delineated for prescribed fire and timber management treatments (Figure 19). This project area surrounds Forest Park feedground, and is designed to provide benefits to elk winter, parturition, and transition ranges. A variety of other wildlife will also benefit from setting succession back in the aspen, conifer, and mountain-shrub communities that are being targeted. Increased forage production in this area has the potential to maintain elk on native winter range for longer durations of time, which can help decrease the risk of intraspecific disease transmission. Large-scale burn projects like this provide the best opportunity for aspen to rejuvenate on the landscape given browse concerns in areas of high elk densities.

This project is in the earliest stages of planning for WGFD and BTNF biologists. The implementation will not be for several years due to the size of this project and the NEPA requirements associated with it. WGFD will continue to assist with planning by conducting vegetation mapping, providing input on vegetation objectives, and monitoring pre-burn vegetation conditions.

Star Valley Front Habitat Enhancements

In 1983, WGFD biologist Dave Lockman delineated crucial and transitional wintering foraging sites for mule deer and elk along the Star Valley Front (Figure 20). The sites were delineated after extensive observations of foraging ungulates and were thus recommended for habitat enhancement. No treatments have been implemented within the sites to date. The WGFD and BTNF-Afton Ranger District agreed at a coordination meeting in April 2006 to inventory the sites and reassess their potential for enhancement through various treatment methods. Inventories will be initiated in 2006, with treatment recommendations to follow during the 2006-2007 winter.

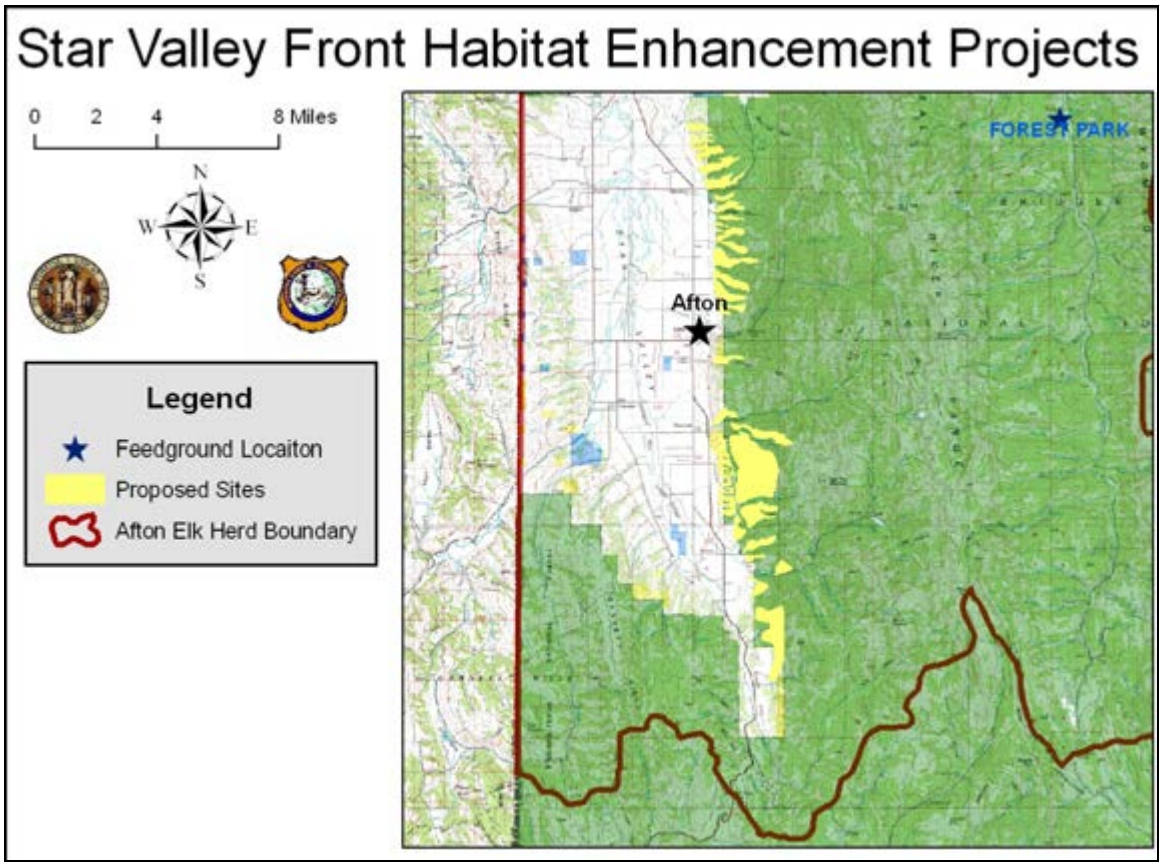

Figure 20. Proposed sites for habitat inventory and treatment along the Star Valley Front.

Black Canyon/Bug Creek Habitat Improvement Project

A third outcome of the 1994-1995 inventory was a proposal from the WGFD to conduct a prescribed burn(s) in the Black Canyon/Bug Creek area. Personnel with the Afton Ranger District wished to integrate timber/salvage sale options with prescribed fire treatments. As a result, managers identified eight different treatment units that would be a combination of clearcutting, selective logging, patch cutting, firewood cutting, and prescribed burns.

The decision notice to implement the treatments was signed in the summer of 1997 by the District Ranger, but the project has not been implemented to date. However, the Afton Ranger District did resurrect the project in December 2005 with a scoping letter. The project has been changed to include prescribed burning of approximately 500 acres of sagebrush and meadow habitat at the mouth of Bug Creek in the spring/late summer of 2006, or as soon as possible thereafter. The proposal also includes selective harvest of up to approximately 80 acres within the project area, retaining Douglas-fir trees greater than 14 inch DBH, and stimulating aspen regeneration (Figure 21).

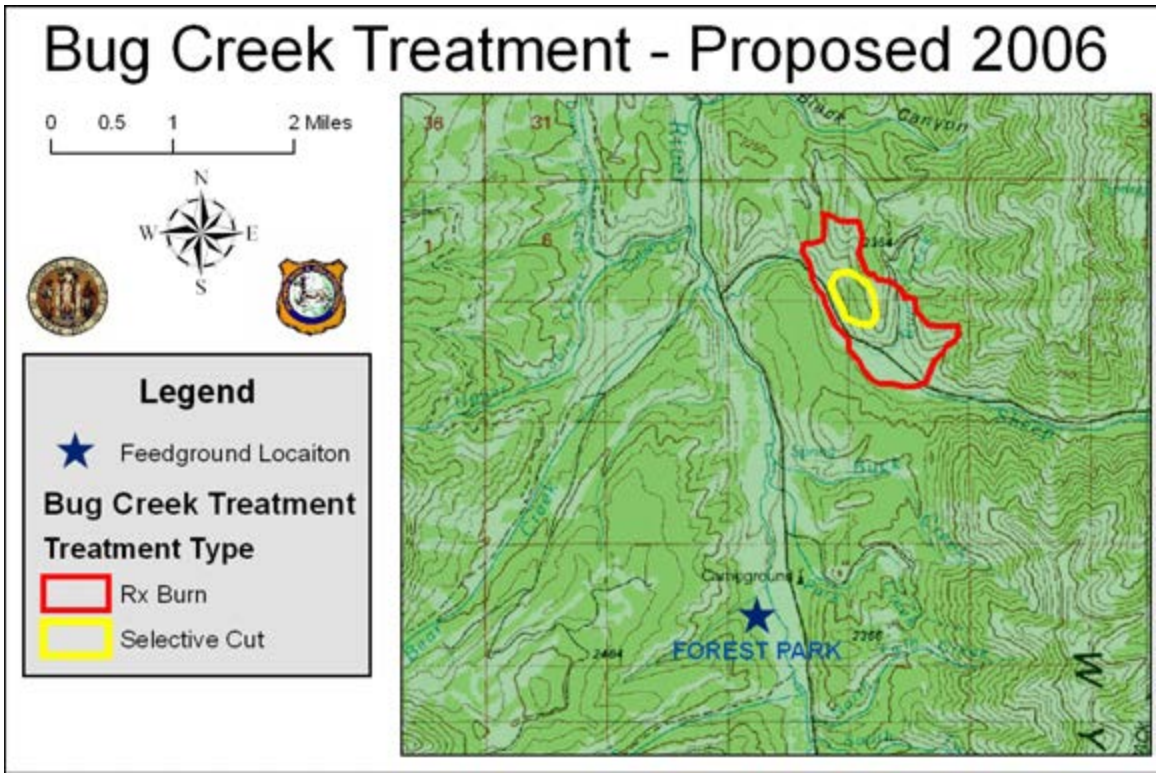

Figure 21. Proposed habitat treatments in the Bug Creek area of the Greys River drainage.

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