Upper Green River Elk Herd Unit (E107)
Brucellosis Management Action Plan
July 7, 2006

A. Introduction

The Upper Green River Elk Herd Unit (UGREH) is located on the northwest slope of the Wind River Mountain Range in northern Sublette County, Wyoming and includes elk from Hunt Areas (HA) 93, 95 and 96 (Map 1). The area is bound on the northwest by Hoback Rim, the north by Union Pass, the east by the Continental Divide, the southeast by Pine Creek and Fremont Lake, and the southwest by the Green River. Total area of the UGREH is approximately 828 square miles (mi²), of which 819 mi² are considered occupied elk habitat. Approximately 555 mi² is delineated as Spring/Summer/Fall range, 46 mi² as Crucial Winter Yearlong, and 218 mi² as Winter (Map 2). Three feedgrounds are located within the UGREH: Green River Lakes, Black Butte, and Soda Lake. The Green River Lakes feedground was established to minimize starvation losses, while the other two feedgrounds were developed primarily to reduce depredation to privately owned stored hay.

The U.S. Forest Service (USFS) manages the majority of lands within the occupied elk habitat in the UGREH, with 30.7% designated as Wilderness (Bridger Wilderness). Private lands comprise 20.5 % of the herd unit with most concentrated at lower elevations associated with riparian and floodplain habitat of the Green River, New Fork, and Willow Creek drainages.

This Brucellosis Management Action Plan (BMAP) was prepared to develop strategies for dealing with brucellosis issues in the Upper Green River Elk Unit (UGREH). Appendix 1 includes data and information relevant to understanding, formulating, and implementing this plan.

B. Brucellosis Management Options

The Wyoming Game and Fish Department (WGFD) currently employs several methods to minimize intraspecifc transmission of brucellosis among elk. Elk feeders are encouraged to feed hay on clean snow when possible to reduce inadvertent ingestion of contaminated exudates. Elk are ballistically vaccinated with Strain 19 on 21 of 22 state feedgrounds, including all three in this herd unit, and currently on the NER in an effort to reduce abortion events. Attempts have been made to reduce the duration of the feeding season on each feedground. Damage and co-mingling concerns typically necessitate long feeding seasons on many feedgrounds.

Damage and co-mingling concerns contribute to increasing the risk of intraspecific disease transmission among elk. In most circumstances, elk are not tolerated consuming private crops and/or co-mingling with cattle. Strategies to hold elk on artificial feed longer and hazing elk to feedgrounds are often employed to minimize conflicts. This increases the chance an aborted fetus contaminated with *Brucella* may be contacted by elk wintering on feedgrounds, increasing exposure rates among elk.

Feedground management should continue to include the aforementioned methods currently utilized to minimize disease transmission. However, given current brucellosis seroprevalence rates for elk on feedgrounds and the recent brucellosis occurrences in

cattle, these methods alone may not be sufficient to reduce incidence of the disease in elk to acceptable levels and prevent future interspecific transmissions. Alternative management options are being evaluated.

The intent of this document is to summarize existing data associated with elk and brucellosis management in the UGREH; detail potential areas where a high risk of disease transmission exists; incorporate feedback from land management agencies, State Veterinarian, APHIS, and livestock producers, and develop a list of management actions that could, if implemented, 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 UGREH. 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 or elk concentrations would have to be reduced during periods of high transmission risk. Reduced feeding durations would increase commingling if implemented abruptly, but reducing elk numbers prior to initiating the option could limit 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 length of feeding and/or the eliminating feeding are 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 (February 5 to June 15). Livestock producers may have the potential to alter management to maintain this separation. As with feedgrounds, each producer and their operation is unique and what may work on one ranch may not work on another.

Listed below are potential options for managing brucellosis on the three feedgrounds in the UGREH. A discussion of each follows, respectively. Short-term objectives of these options are to reduce co-mingling of elk and cattle and 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. Implementation of several options together will likely be more effective than instituting any option alone. The Wyoming Game and Fish Commission (WGFC) will require support from various constituencies (agriculture, land management agencies, sportspersons, etc.) prior to pursuing these options, and several options will require decisions from entities other than the WGFC.

1. Re-locating the feedground to a lower elevation site with increased area for elk to disperse and increased distance from winter cattle operations
2. Elimination of the feedground
3. Reducing numbers of elk on the feedgrounds through increased harvest
4. Reducing numbers of susceptible cattle and stored crops in areas around feedgrounds during winter, or implementing changes in cattle operation by providing incentives to producers.

5. Elk-proof fencing of problem areas and private lands to prevent elk from drifting onto private land and reduce commingling.
6. Elimination of seropositive elk on feedgrounds through test and removal program
7. Extensive habitat enhancement projects in suitable winter range areas near feedgrounds where the potential of commingling with livestock is minimal
8. Acquisition of native or potential winter range through fee-title purchase, conservation easements, or other methods
9. Strain 19 elk vaccination

C. Discussion of Options

1. Feedground Relocation

This option would initially require a suitable area lower in elevation, in a lower precipitation zone, either with no winter cattle operations in the vicinity or in conjunction with option 5 to prevent commingling. Current habitat conditions should be evaluated to determine production, health of vegetation, and approximate potential of the area. All lands within the BLM Pinedale District are leased for grazing, so it is likely one or more permittees would need to be involved in the selection of a particular area. If purchase of AUM's is a viable option for the permittee, this could reserve forage for elk and other wildlife. Additionally, implementation of option 8 may facilitate realization of this option. Decision authority would lie with the permittee and BLM.

Pros:
-may decrease feeding duration
-may contribute to lower brucellosis prevalence
-elk may have greater area to disperse
-feeders may be able to feed in larger areas and on clean snow
-elk numbers could be maintained at or near current levels
-may decrease damage and co-mingling situations
-less localized damage to vegetation

Cons:
-problems may be experienced during initial habituation of elk to the new site
-problems may arise in spring when elk are migrating to higher elevations and may be attracted to private crops en route (these problems exist near some feedgrounds in their current locations)
-brucellosis prevalence may persist
-more localized damage to vegetation
-may increase competition of elk with mule deer, antelope, and sage grouse
-would require funds for erection of new structures, fences, roads, etc.

Black Butte is the most apparent feedground in the UGREH where relocation could improve brucellosis management. Most elk/livestock conflict within the UGREH is associated with elk that leave this feedground during the supplemental feeding season. Moving the feedground to nearby BLM or USFS land is not a possibility at this time, and would probably not lower brucellosis transmission risks to cattle. Alternatively, elk from Black Butte feedground could be relocated to the existing Soda Lake feedground. In

recent years, numbers of elk attending the Soda Lake feedground have been below objective. Consolidation of these two feedgrounds has occurred in the past due to elk leaving the Black Butte feedground; elk numbers on Soda Lake feedground were between 1,000 and 1,300 in those years. Consolidation could provide a greater opportunity for elk to free range, increased harvest opportunity, and a shorter feeding season, which may lower brucellosis prevalence in elk from the Black Butte feedground. However, higher elk numbers at the Soda Lake feedground might act to increase elk concentrations and length of feeding season, thus encouraging brucellosis transmission. Additionally, it may be difficult to keep elk spatially separated from cattle on their route from Black Butte to Soda Lake feedground. Further implementation of option 7 on the southerly exposure above Willow Ridge and other areas near the Soda Lake feedground may facilitate realization of this option. The WGFC has the authority to make this decision.

2. Feedground Elimination

This option is intended to lower brucellosis transmission among elk by decreasing concentrations and is more likely to be successful if administered as a "phase-out." Risk of damage/commingling, especially in the initial years may prohibit implementation of this option. However, if current conditions and herd objectives change, through implementation of one or more of options 3,4, 6, and 8, this option may become more realistic.

Pros:

-would reduce the risk of intraspecific transmission of brucellosis and other diseases
-would facilitate efforts to eliminate brucellosis in elk within the UGREH
-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 abruptly with current numbers of elk and/or prior to elimination of brucellosis in elk
-would increase elk winter mortality
-would lower the number of elk that could be maintained in the UGREH
-would reduce income to the WGFD due to reduced license sales
-would reduce hunter opportunity
-may increase potential for vehicle-elk collisions on Highway 352

This option, given current conditions and herd objectives, is probably unfeasible for the Black Butte feedground, unless elk were relocated to an existing feedground where intra- and interspecific brucellosis transmission risks were currently lower (i.e., Soda Lake feedground). Green River Lakes has a high potential due to low damage/commingling risk. Soda Lake feedground also has a high potential because of the 25-mile elk fence and high quality and quantity of native forage surrounding the feedground. This option would probably require implementation of option 3. Options 4, 6, 7,and 8 would also facilitate successful implementation. The WGFC has the authority to make this decision.

3. Elk Reduction

Reducing elk numbers on feedgrounds in the UGREH through liberalized hunting seasons could allow more flexibility to pursue options 1, 2, and 6, and could facilitate conditions for options 7 and 8. The WGFC has the authority to make this decision.

Pros:

-may contribute to lower brucellosis prevalence
-could increase hunting opportunities in the short term
-could 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 may continue as hunter harvest is random and does not select for "problem" elk
-the general public may be unwilling to accept large reductions in elk numbers
-success may be limited to hunter efficiency
-would cause a loss of some hunting opportunity in the long term
-may reduce license revenue in the long term (may be offset by reduced management costs)

All feedgrounds within the UGREH would probably be affected positively from a disease transmission standpoint. The Black Butte feedground may benefit most due to the limited hunting access and because elk numbers exceed quotas established by WGFC policy.

4. Cattle Producer Change of Operation

This is an option that high-risk producers and others within the UGREH could implement to minimize/eliminate brucellosis risks to their herds. Changing cattle operations from cow/calf to yearling, spayed heifer, or steer would eliminate brucellosis transmission potential within cattle and testing requirements associated with cow/calf operations. Conversion to yearlings would also eliminate the need of storing most hay crops and winter-feeding, reducing winter elk conflicts. Smaller changes in operations, such as developing a water source enabling the producer to calve in a lower risk area, are other options that could be more appealing if incentives were provided. Implementing facets of this option would require a decision from the producer and possibly a favorable decision by the BLM or USFS to alter grazing permit(s).

Evaluation and implementation of the alternatives in this option are totally under the jurisdiction of individual livestock operators, Wyoming Livestock Board, State Veterinarian and APHIS. Discussion and recommendations pertaining to this option should be contained in Individual Herd Reports for each livestock operation.

5. Fencing

Elk proof fencing of winter cattle feedlines or problem areas could prevent elk from co-mingling with cattle. This would require favorable decisions by the landowner. Additions of a wing to the existing 25-mile elk fence may improve ability to haze elk from private land during winter (Map 3).

Pros:
-may reduce damage complaints and compensation expenditures for WGFD
-may reduce risk of elk-cattle brucellosis transmission

Cons:
-costs may be prohibitive
-large areas of fencing could impede migrations of other wildlife
-does not address seroprevalence of brucellosis in elk
-some producers may be unwilling to erect fencing

Interspecific disease transmission risk in association with Black Butte feedground would decrease more than other feedgrounds in the UGREH with implementation of this option because damage/commingling risk connected with elk from this feedground is currently higher.

6. Elk Test and Slaughter

This option could eliminate a percentage of seropositive animals on a feedground. The number of aborted fetuses and associated fetal fluids contaminated with *Brucella* bacteria may be decreased. The WGFC has the authority to make this decision.

Pros:
-may reduce brucellosis prevalence in elk
-may reduce elk numbers to more efficiently pursue options 1,2,6,7, and 8.
-may increase tolerance of elk on private lands if brucellosis prevalence is decreased

Cons:
-would require erection of large traps on feedgrounds capable of working many animals with large holding pens, incurring significant logistical costs
-must be implemented on all feedgrounds for long-term years to minimize possibility of future increases in brucellosis prevalence.
-the general public may not support such an operation due to decreased elk numbers
-does not address other potential diseases on feedgrounds
-all seropositive animals may not be infected with the disease

The rates of both intra- and interspecific brucellosis transmission may decrease on all feedgrounds within the UGREH given implementation of this option. This option is not a possibility in the UGREH until completion and evaluation of the 5-year Test and Slaughter Pilot Project in the Pinedale Elk Herd Unit.

7. Habitat Enhancement

These projects have been utilized in areas adjacent to feedgrounds with some success in reducing feeding duration. Decision authority is with the BLM and USFS for most areas.

Pros:
-could reduce feeding duration and brucellosis prevalence
-could decrease WGFD costs of feeding elk
-would benefit many species of wildlife and, in some instances, cattle

Cons:
-may have limited effectiveness in reducing dependency on supplemental feed by the availability of forage in years of high snowfall
-elk may not be tolerated on treatment areas when in close proximity to livestock
-post-treatment wildlife and livestock management within the treatment area would impact treatment effectiveness

This option may be best used in conjunction with options 1,2,3, and 8 to achieve maximum success. The risk of intra- and interspecific disease transmission may decrease on the Green River Lakes and Soda Lake feedgrounds. There is a low potential for a brucellosis management outcome with implementation of this option near the Black Butte feedground.

8. Acquisition/Conservation Easements

This option secures habitat for myriad wildlife species. With adequate intact, healthy, and accessible elk winter habitat available, the need for some feedgrounds could be eliminated, although current elk numbers may not be maintained. The buying or long-term leasing of land to be managed and maintained solely for wildlife 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 1 and 2
-may act as a forage reserve for cattle grazing and provide rest to facilitate option 7
-could reduce brucellosis prevalence in elk

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

Disease transmission risk on all feedgrounds within the UGREH may decrease by managing lands adjacent to, or connected with, native elk winter ranges. This option could be combined with option 1, 2, 3, 5, or 7.

9. Continuation of Strain 19 Elk Vaccination Program

The WGFD initiated this program in 1985 on Grey's River feedground, and has vaccinated around 66,000 elk to date on 21 state operated feedgrounds and the National Elk Refuge. 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.

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). Long-term field study of brucellosis seroprevalence on Dell Creek and Grey's 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 as an active disease management tool currently employed

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

Personnel from the WGFD and the BLM met on November 22, 2005 at the BLM's Pinedale Field Office to discuss alternative management options to elk feedgrounds and brucellosis management in the UGREH. As management options concerning native elk winter range and the development/easement/acquisition/enhancement thereof does not primarily involve BLM lands, these communications were limited in scope to conducting habitat treatments in areas of elk transitional ranges and limited areas of potential elk winter range on BLM lands. There is little to no BLM land associated with Green River Lakes or Soda Lake feedgrounds. Habitat improvements near the Black Butte feedground may have little implication on brucellosis management until parturition season due to typical snow levels in the area. It was agreed to work cooperatively between agencies and with private landowners to develop habitat treatments designed to improve forage quantity/quality and decrease concentration on feedgrounds, if elk/cattle separation can be maintained. BLM personnel emphasized that moving Black Butte feedground onto BLM land is not a viable option. It was noted that BLM grazing allotments with turn-on dates prior to June 15th do not overlap with WGFD-delineated elk parturition ranges (Map 4). Risk of elk/cattle commingling on BLM allotments appears low.

Several personal communications were held between WGFD and USFS personnel in the Pinedale Ranger District of the BTNF. As management options concerning native elk winter range and the development/easement/acquisition/enhancement thereof does not primarily involve USFS lands, these communications were limited in scope to conducting habitat treatments in areas of elk transitional ranges and limited areas of potential elk winter range. It was reviewed that under current circumstances, there is little flexibility for movement of livestock from allotments to provide a 3-year grazing rest (1 pre-treatment, 2 post-treatment) for prescribed burns. Consequently, many habitat treatments have been planned and conducted opportunistically. Recently, some habitat treatments were cancelled due to lack of alternative space for livestock grazing. Thus, the need for a forage reserve is emphasized if habitat enhancements are to be implemented both when and where they are needed. USFS and WGFD are working cooperatively to obtain funding necessary to develop a forage reserve. USFS personnel indicated willingness to pursue habitat treatments in the UGREH area that may, if implemented, result in reduced dependency of elk on supplemental feed. These discussions are ongoing and WGFD personnel are actively delineating areas for treatment that may be of benefit to brucellosis management.

E. Proposed Management Practices

1. Feedground Relocation

The WGFD will work to scientifically evaluate pro's and con's of relocating elk from Black Butte feedground to the current Soda Lake feedground. These activities may include, but are not limited to:

-Determining percent increase in elk concentration and potential effects on transmission.
-Estimating increase in harvest opportunity and effects on population size and elk concentration.
-Identifying potential effects of consolidation on attributes of supplemental feeding season. This may be addressed by evaluating effects of past feedground consolidations. Hay was trailed from North Piney feedground to Bench Corral feedground in winter 1995-1996. This consolidation moved elk from a long feeding season with little opportunity to free range to a feedground more conducive to winter free-ranging activities.
-Evaluate increase or decrease of damage/commingling risk.
-Evaluate potential impact of perceived elk numbers on native habitat.
-Develop logistics to implementation consolidation and potential risk factors.

2. Feedground Elimination

The WGFD will not pursue this management practice in the immediate future given existing elk brucellosis seroprevalence rates and public expectations for current elk numbers. The highest probability for successfully implementing this option is with the Green River Lakes and also the Soda Lake feedground. WGFD employees will pursue all opportunities that will facilitate this option.

3. Elk Reduction

The WGFD manages for current, WGFC established, elk herd unit population objectives. Elk herd unit reviews occur every 5 years. Elk herd unit management, including population objectives for the UGREH, was publicly reviewed during April 2006. Following public input, the WGFD presented recommended herd unit population objectives to the WGFC for their consideration and action. No changes were recommended or adopted, and the population objective remains at 2,500. The WGFD will design harvest strategies to ensure elk populations are maintained at established herd unit objectives.

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. WGFD will work with other agencies and cattle producers and to identify and secure compensation or incentives to producers for management changes.

5. Fencing

There are no current plans to construct fencing for brucellosis management in the UGREH. An addition of a wing to the existing elk fence has been identified on private land that may improve ability to haze elk from commingling situations to the Black Butte or Soda Lake feedground. These discussions between the WGFD and landowner are ongoing.

6. Elk Test and Removal

The WGFD will implement the recommendations of Wyoming Governor Fruedenthal's Brucellosis Coordination Team and carry out a 5-year pilot test and slaughter project on the three feedgrounds in the Pinedale elk herd unit. Following the five-year pilot project, the WGFD will evaluate the technique and determine if this management option warrants further consideration in the UGREH.

7. Habitat Enhancement

The WGFD will continue to coordinate with private landowners, federal land managers and livestock permittees to develop and implement habitat improvements that may reduce elk dependency on supplemental feed.

Several areas have been identified in the UGREH unit near feedgrounds. Pinyon Ridge, north and east the current Green River Lakes feedground, includes several large south-facing slopes currently and historically used by wintering elk. These 21,000 acres are part of the 32,000-acre Moose-Gyp project proposed by the USFS that could begin as early as 2006 and be implemented over the next 10 years. WGFD personnel have worked closely in development of this project and will continue to work cooperatively to obtain funding for implementation of the treatments. The agencies will also work to obtain funding for development of forage reserves to provide alternate pasture for willing producers whose current allotment(s) are being rested for habitat treatments.

Near the Soda Lake feedground, habitat treatments on the large southerly exposure on the ridge north of Willow Lake may be beneficial to managing brucellosis. Also, Big Flattop Mountain is an important staging area during fall and parturition season and is in

need of treatment. Gaining authorization to implement treatments on Big Flattop Mountain may be difficult because it is located in designated Wilderness area. The WGFD will work cooperatively with USFS to pursue habitat enhancement of these areas.

8. Acquisition/Conservation Easements

The WGFD will continue to identify and pursue all opportunities that will facilitate our efforts to move or eliminate the feedgrounds in the UGREH or reduce feeding duration on all feedgrounds. Project proposals have and will continue to be submitted to the Wildlife and Natural Resources Trust, as well as other funding sources, to facilitate implementation of this option.

9. Vaccination of Elk Calves

The WGFD will continue the ballistic Strain 19 elk vaccination program until adequate data are collected 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 will be considered for elk feedground and livestock management. Some may be currently employed, and should be maintained. Others may or may not be viable options for individual feedgrounds and livestock producers.

Feedground Management

1. Encourage feeders to feed on clean snow whenever possible
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. Implement large-scale habitat treatments near feedgrounds
5. Maintain ballistic Strain 19 elk vaccination program
6. Prevent elk/cattle commingling

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 assess efficacy of the Strain 19 vaccination program and monitor incidence of the disease. Additionally, statewide surveillance for brucellosis in elk will be conducted by surveying elk hunt areas in approximately one fourth of the state each year. The Department plans to assemble a portable trap on the Soda Lake and Bench Corral feedgrounds during winter 2006-07, which will improve brucellosis surveillance for a portion of the UGREH.

Information and Education

WGFD personnel regularly inform and educate various public factions about wildlife diseases, including brucellosis. Educational outreach has included group presentations, news releases, interpretive signs at feedgrounds and crucial winter ranges, and various brochures and publications. The importance of quality wildlife habitat and the substantial role fire plays in natural ecosystems are also stressed during public forums. WGFD field staff make numerous private landowner contacts regarding habitat improvement projects, wildlife-friendly management techniques, or ways to prevent commingling of elk and livestock. Additional efforts are focused on area school groups and events such as the WGFD's annual Hunting and Fishing Expo in Casper to inform the general public of the vaccination program and brucellosis management.

These efforts should be continued to inform the public of the WGFD's role in brucellosis management and relay consequences of the disease to the State's economy. 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 disease in elk on feedgrounds and the risk of transmission from elk to cattle necessitate accurate and reliable data to facilitate decisions. Most 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. Potential research topics that could assist in management decisions are listed below.

1. Relationship of seropositive vs. culture positive, and strain of *Brucella*, in feedground elk.
2. Characteristics of scavenging of aborted fetuses 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/parasite presence (other than brucellosis) and in elk on feedgrounds and the relationship with *Brucella* immune response.
6. Relationship of coyote densities and scavenging rates on feedgrounds.
7. Abortion and viable birth rates, and temporal and spatial distribution of abortions and births, in seropositive feedground elk.
8. Relationship of brucellosis seroprevalence and feeding duration.
9. Connection between snow-water equivalency measurements and elk use and distribution, especially in areas of habitat enhancement projects, both past and future.
10. Carrying capacity studies of available winter habitat near feedgrounds.

11. Quantify interchange of elk among feedgrounds and herd units.
12. Efficacy of using vaginal implant radio-transmitters to remove aborted fetuses from feedgrounds as a tool to prevent brucellosis transmission among elk.
13. Relationship between seropositive titers and abortion events

Appendix 1.

A. Historical Elk Herd Management

Prior to establishment of feedgrounds along the west slope of the Wind River Mountains, elk migrated from the higher elevations south to winter in the desert. Not all elk migrated; State Game Warden D.C. Nowlin reported during 1908-09 winter over 300 elk wintering in the Upper Green near the "Big Bend" area. Due to foraging competition between wintering wildlife and summering cattle, the Roaring Fork drift fence was constructed in 1924 to protect the elk winter range in the vicinity of the Green River Lakes area from heavy use by cattle. The first known record of supplemental elk feeding within the UGREH occurred during the winter of 1906-07, when 200 elk snowbound on Willow Creek, north of Pinedale, Wyoming, were fed hay. During the winter of 1948-49, elk were reportedly fed throughout Wyoming with approximately 2,000 head fed in the Green River-Pinedale area. Feed records indicate that routine supplemental feeding began on Black Butte and Soda Lake feedgrounds at this approximate time. The Wyoming Game and Fish Department (WGFD) began supervising supplemental elk feeding in the UGREH in 1959-60 with 307 elk fed on Soda Lake feedground. The present locations of the Green River Lakes and Black Butte feedgrounds were established in the winters of 1961-62 and 1967-68, respectively.

Elk herd management regimes in the UGREH are designed to maintain elk numbers established by the WGFD Commission. Current Commission feedground quotas are as follows: Green River Lakes, 675; Black Butte, 500; and Soda Lake, 800. These quotas were last changed in 1987, when the objective for Black Butte was increased from 357 to the current quota. The current post-hunt population objective for the UGREH is 2,500 elk, with 1,975 on feedgrounds and the remaining 525 on native winter range.

B. Current Elk Herd Management

Population Estimate

The posthunt population objective for this herd is 2,500 elk. The postseason 2005 population was estimated at 2,506 elk, which is up from the 2004 postseason estimate of 2,258. The UGREH is an extremely leaky herd unit, and as a result, a functional computer simulation model has not been developed. Hence, hand calculations using reported harvest and sex/age classification data obtained from post-season surveys were used to estimate population size. The amount of elk movement from this herd unit makes simple hand calculations difficult and gives managers little confidence in posthunt estimates. By example, hand calculations for posthunt 2005 projected lower calf elk ratios than observed (19:100 modeled versus 24:100 observed). The discrepancy in population estimates between 2004 and 2005 demonstrates the difficulty in even hand modeling from one year to the next, particularly between years with contrasting winter severity. Data from 2002-2004 show that trend counts have been the lowest of any reported in the past ten years (Table 1). It appears that changes made to liberalize seasons to promote additional harvest in Hunt Areas 93 and 96 during 2000-2002 have been successful (especially during 2002). Bull ratios declined from 2001 levels and have remained lower, since initiating general license hunting in Hunt Area 93 (Table 2). In

addition, wolf depredation was documented at Soda Lake in 2003 and 2004 and wolves caused elk to leave Black Butte feedground mid-winter during 2001 and 2002. This mid-winter movement has confounded our ability to assess the actual number of elk that tried to winter at both Black Butte and Soda Lake feedgrounds. Seasons were structured during 2004 and 2005 to reduce overall harvest in Area 96 to build elk in that area. It appears by the 2005 counts that elk numbers have increased in Area 96 and the entire herd unit.

Trend Count and Herd Composition Survey

The 2005 elk trend count was 2,255, which is higher than the previous two years of 1,870 and 1,919 (Table 1). The 2005 count is higher than the five-year average (2000-2004) of 2,065 elk. Declines in 2002 and 2003 were attributed to less elk counted on feedgrounds in Hunt Area 96 (typically elk from Hunt Areas 93 & 96), which had very liberal hunting seasons. A total of 240 elk were counted on native winter range during 2005, a decrease from the 2004 count, which can be attributed to above average snow levels. Conversely, feedground counts at all three locations showed increased attendance, likely more severe snow conditions than in recent years.

Table 1. Trend Count information for the Green River Elk Herd Unit, 1996-2005.

Location	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Green River Lakes F.G	517	478	477	381	0	481	446	504	358	556
Black Butte F.G	614	610	667	740	787	296	131	577	723	882
Soda Lake F.G.	852	885	895	1015	800	1304	906	551	313	577
N.W.R.	496	565	359	405	838	148	402	238	525	240
Herd Unit Total	**2479**	**2538**	**2398**	**2541**	**2425**	**2229**	**1885**	**1870**	**1919**	**2255**

Composition counts during 2005 revealed a bull:cow:calf ratio of 23:100:24, which was similar to the 22 bulls: 100 cows and lower than 28 calves: 100 cows observed in 2004 (Table 2). Compared to the past 5-year average of 24 bulls:100 cows:25 calves, 2005 bull and calf ratios are slightly lower. Improved yearling bull ratios in 2005 can be attributed to higher calf survival in 2004.

Table 2. Herd composition count summary for the Green River Herd Unit, 1996-2005.

	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Ad. Male:100 Females	20	17	20	16	16	18	14	16	15	13
Yrlng Male:100 Females	9	12	11	11	11	11	8	7	7	10
Total Males:100 Females	29	29	31	27	27	29	22	23	22	23
Juveniles:100 Females	35	32	32	25	32	30	20	23	28	24

Harvest

A total harvest of 450 elk (203 antlerless and 175 bulls) was reported in 2005. Total harvest was lower than the 2004 harvest of 511 elk (270 antlerless and 241 bulls), see Table 3. The 2004 season length was shortened and limited quota licenses were reduced in Hunt Area 96 to build elk numbers in that area. During 2005, season length and limited quota licenses were once again reduced in Area 96 to build elk numbers. The reported elk harvest of 450 for 2005 was slightly less than the projected harvest of 475 animals in this herd unit due to hot and dry weather throughout October.

During 2005, 32% of the hunters were successful in harvesting an elk and averaged 23 days for every animal taken (Table 3). The 2002 - 2005 seasons showed very similar success rates and number of days/kill.

Table 3. Harvest trends in the Green River Herd Unit, 1996-2005.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Adult Males	152	170	145	138	185	155	165	179	217	144
Yearling Males	19	37	26	24	60	28	14	27	24	31
Total Males	171	207	171	162	245	183	179	206	241	175
Females	311	326	313	212	357	284	352	260	226	203
Juveniles	140	42	46	54	107	41	114	55	44	72
Total Harvest	**622**	**575**	**530**	**428**	**709**	**508**	**645**	**521**	**511**	**450**
Success Rate	38%	48%	34%	26%	44%	32%	35%	31%	33%	32%
# Day / Animal Taken	20	19	19	28	18	24	21	23	22	23

Given the recent increase in the trend count and population estimate, the 2006 season will liberalize harvest opportunities in Area 96 and make some minor changes in Area 93 and 95. The same season length (October 1 – November 15) and number of limited quota licenses are available for Area 93, although general license hunting will be eliminated. Area 95 will have the same season and licenses as 2005. Area 96 will allow general license hunting in last half of October as in the past. Limited quota licenses will remain the same as 2004, although these license holders will have a longer season, as Type 1, 2 and 6 licenses will be valid for antlerless elk from November 1 – 15. Projections for the 2006 season estimate a harvest of approximately 200 bulls, 266 cows, and 66 calves and result in a post season 2006 population of approximately 2,331 elk. The 2006 harvest estimates should stabilize or slightly reduce the overall population and maintain bull ratios with this season.

Ear Tag Returns

In an effort to increase understanding of elk movements in and out of the UGREH, a trapping and tagging program has been conducted periodically since the 1940's. Although the total number of elk that have been ear tagged in the past is unknown, substantial movement into and out of the UGREH has been documented. Tagging data summaries prior to 1996 show that 15%, 18%, and 29% of the elk tagged at Soda Lake, Black Butte, and Green River Lakes Feedgrounds were killed outside the UGREH.

Recent trapping and tagging efforts in the UGREH were conducted at Black Butte during 2000 and Green River Lakes during 2002. A total of 66 elk were captured and tagged at Black Butte during 2000 and 74 elk at Green River Lakes during 2003. Tag returns from 2000-2003 totaled 14 animals (Table 4). Of those 14 elk, 12 were tagged at Black Butte Feedground and 2 at Green River Lakes Feedground. A detailed breakdown shows that of the tag returns (n=12) from Black Butte, 17% were killed in HA 87 (outside the UGREH), 25% and 58% harvested from HA 93 and 96 (in the UGREH). The two tags returned from Green River Lake Feedground were taken within the UGREH (HA 95).

Table 4. Tag returns from the Upper Green River Elk Herd Unit, 2000-2003.

Tag #	Date Tagged	Tag Location (HA)	Sex	Age	Kill Date	Kill Location (HA)
B0063	1/29/2000	Black Butte FG (96)	M	Y	10/15/2000	Cabin Draw (87)
B0054	1/29/2000	Black Butte FG (96)	F	J	10/22/2000	North Fisherman Creek (87)
B0135	2/2/2000	Black Butte FG (96)	M	J	10/1/2001	Little Soda Lake (96)
B0018	1/29/2000	Black Butte FG (96)	M	J	10/3/2002	Badger Creek (93)
B0005	1/29/2000	Black Butte FG (96)	F	A	?	Warren Bridge (93)
B0126/27	2/2/2000	Black Butte FG (96)	M	J	10/8/2002	Willow/New Fork Lake (96)
B0003	1/29/2000	Black Butte FG (96)	F	A	10/15/2002	Black Butte (96)
B0074/75	1/29/2000	Black Butte FG (96)	F	A	11/1/2002	Bill Kellen's Ranch (96)
B0030	1/29/2000	Black Butte FG (96)	F	Y	11/10/2002	New Fork (96)
B0078/79	1/29/2000	Black Butte FG (96)	F	A	11/11/2002	Little Flat Top Mt. (96)
B0068/69	1/29/2000	Black Butte FG (96)	M	J	10/2/2003	New Fork Lookout (96)
G5017	1/12/1993	Green river Lakes FG (95)	F	A	10/16/2002	Roaring Fork (95)
A0326/27	1/15/1991	Green river Lakes FG (95)	F	A	10/28/2003	Little Sheep Mt. (95)

In addition to placing ear tags on all elk, neckbands were placed on all adult and yearling females captured. This was meant to facilitate live observations in the summer and fall, and to allow quick identification on the feedground in following years. Neckband observations during the past several years have also documented substantial movement in and out of the UGREH. Neck-banded elk from the National Elk Refuge and Alkali Feedground (Jackson Elk Herd Unit; JEH) have been found in Pinyon Ridge/Osborn Mountain area, near the Green River Lakes feedground. Radio-collared elk from the JEH have been documented spending the summer and fall in the Upper Green River drainage. Neck-banded elk from the Hoback Elk Herd Unit have also been documented in the UGREH in the past few years.

C. Current Feedground Management

The three feedgrounds in the UGREH vary considerably in some respects (e.g, starting and ending dates, potential damage situations). They are located between summer and traditional winter ranges and facilitate keeping elk away from livestock and private property, and prevent starvation.

Wolves have been present in this herd unit on all three feedgrounds in recent winters. WGFD does not actively search for wolf kills off of feedgrounds, therefore all reports are those that occur on feedgrounds where readily observed. Wolf presence may lead to uneven elk distribution among feedgrounds or moves elk into damage/commingling situations. In previous years, wolves have been reported as the cause of elk moving from the Black Butte to the Soda Lake feedground. In other circumstances, the presence of wolves could act to keep elk on feedgrounds; elk may feel more comfortable around human activity when wolves are around.

Elk in the UGREH were fed an average of 7.03 lb/elk/day, or 0.36 ton/elk, for the feeding season. The cost of feeding elk was $45.67/animal, which is about $17 less than the region average.

Green River Lakes

Feeding began December 24, 2005 and continued until April 7, 2006 for a 104-day feeding season. This was the shortest feeding season since 1975-76 and was 49 days less than the long-term average.

There were 556 elk on feed in 2005-06, which is 49 elk above the long-term average (Table 5) and 119 elk below the Commission quota of 675. Three elk on the feedground died for unknown reasons and 1 was reportedly killed by wolves. Each elk was fed an average 6.73 lb/day or 0.35 ton for the winter. It cost $49/elk at the Green River Lakes feedground in 2005-06.

Table 5. Summary data from Green River Lakes feedground, 1975-76 to 2005-06.

YEAR	ELK #	TONS	DAYS	DEAD	COST/ELK	TON/ELK
1975-76	633	270	122	1	32	0.43
1976-77	660	147	96	0	17	0.22
1977-78	651	377	131	9	43	0.58
1978-79	700	391	156	3	39	0.56
1979-80	650	309	108	7	34	0.48
1980-81	577	311	139	1	42	0.54
1981-82	426	398	164	1	75	0.93
1982-83	435	299	157	3	59	0.69
1983-84	490	386	151	1	65	0.79
1984-85	440	298	134	3	59	0.68
1985-86	560	449	162	6	69	0.8
1986-87	640	315	127	1	45	0.49
1978-88	640	292	110	1	43	0.46
1988-89	645	327	157	9	48	0.51
1989-90	480	190	95	6	47	0.4
1990-91	430	230	138	1	61	0.53
1991-92	408	208	120	3	54	0.51
1992-93	440	257	135	2	67	0.58
1993-94	415	126	106	1	36	0.3
1994-95	430	149	84	0	38	0.34
1995-96	473	233	108	0	53	0.49
1996-97	540	287	128	7	68	0.53
1997-98	480	179	96	5	52	0.37
1998-99	475	177	102	7	42	0.37
1999-00	400	161	96	1	48	0.4
2000-01	325	73	73	0	33	0.22
2001-02	480	214	119	4	66	0.45
2002-03	352	163	92	1	64	0.46
2003-04	504	229	118	1	58	0.45
2004-05	370	79	71	2	32	0.21
2005-06	556	194	104	4	49	0.35
Average	507	249	119	3	50	0.49

Black Butte

Feeding began November 16, 2005 and ended April 27, 2006 for a 162-day feeding season, which is 10 days greater than the long-term average (Table 6). This feedground has a notably longer feeding season than the other two feedgrounds in the UGREH.

Elk numbers at Black Butte in 2005-06 were the highest ever reported at that feedground (n=882). The 2005-06 attendance figures were 367 elk over the long-term average and 382 elk over the Commission quota of 500. There were 9 elk that died on the feedground. One elk was reportedly predated by a wolf and the others died from unknown causes. Elk were fed 8.64 lbs/day and totaled 0.70 ton/elk for the entire winter (Table 6). The cost per elk fed was $84.

Table 6. Summary data from Black Butte feedground, 1975-76 to 2005-06.

YEAR	ELK #	TONS	DAYS	DEAD	COST/ELK	TON/ELK
1975-76	431	310	166	6	48	0.72
1976-77	410	183	97	0	30	0.45
1977-78	488	397	176	1	59	0.81
1978-79	495	308	161	2	41	0.62
1979-80	400	295	159	0	53	0.74
1980-81	506	248	136	0	38	0.49
1981-82	398	320	175	0	63	0.8
1982-83	448	334	185	0	71	0.75
1983-84	400	326	167	0	65	0.82
1984-85	256	167	156	4	58	0.65
1985-86	285	262	161	0	76	0.92
1986-87	424	348	178	2	70	0.82
1987-88	530	162	133	1	34	0.31
1988-89	591	443	164	3	69	0.75
1989-90	553	357	143	4	75	0.65
1990-91	425	336	167	2	88	0.79
1991-92	468	366	160	5	81	0.78
1992-93	550	448	188	1	92	0.81
1993-94	608	344	138	0	60	0.57
1994-95	523	241	127	3	50	0.46
1995-96	425	330	144	2	90	0.78
1996-97	610	484	167	3	92	0.79
1997-98	610	438	163	2	88	0.72
1998-99	667	465	155	2	79	0.79
1999-00	740	441	140	4	64	0.6
2000-01	785	421	148	14	64	0.54
2001-02	296	230	148	1	126	0.78
2002-03	473	213	138	6	62	0.45
2003-04	577	438	161	6	85	0.76
2004-05	725	456	165	4	71	0.63
2005-06	882	618	162	9	84	0.7

Table 6. (continued)

Average	515	346	156	3	69	0.69

Soda Lake

Feeding began January 4, 2006 and ended April 2, 2006. This was a 88-day feeding season and was 23 days less than the long-term average. There were 577 elk fed at this site, which was 77 more than the previous year, 132 less elk than the long-term average, and 223 elk below the Commission quota of 800 elk (Table 7). Seven elk died on this feedground in 2006 due to undetermined causes. Elk were fed an average of 10.45 lb/day, or 0.46 ton/elk/winter. The cost per elk fed was $54/elk for this feedground (Table 7).

Table 7. Summary data from Soda Lake feedground, 1975-76 to 2005-06.

YEAR	ELK #	TONS	DAYS	DEAD	COST/ELK	TON/ELK
1975-76	610	301	141	6	32	0.49
1976-77	465	121	104	0	19	0.26
1977-78	700	427	143	15	43	0.61
1978-79	675	430	145	23	41	0.64
1979-80	640	284	151	2	30	0.44
1980-81	330	86	126	0	24	0.26
1981-82	586	341	149	5	47	0.58
1982-83	620	390	142	5	52	0.63
1983-84	630	366	141	2	47	0.58
1984-85	569	262	130	2	39	0.46
1985-86	715	463	158	10	52	0.65
1986-87	615	265	103	5	37	0.43
1987-88	503	149	110	0	34	0.3
1988-89	800	370	138	4	43	0.46
1989-90	760	238	89	1	36	0.31
1990-91	800	433	134	4	51	0.54
1991-92	670	337	118	4	54	0.5
1992-93	810	386	129	1	53	0.48
1993-94	500	59	47	0	15	0.12
1994-95	600	109	66	1	22	0.18
1995-96	1090	416	90	3	43	0.38
1996-97	852	457	118	12	65	0.54
1997-98	885	268	74	1	36	0.3
1998-99	895	267	90	3	32	0.3
1999-00	1015	366	91	1	38	0.36
2000-01	800	323	98	5	48	0.4
2001-02	1304	449	117	7	51	0.34
2002-03	906	148	51	1	21	0.16
2003-04	551	207	90	10	46	0.38
2004-05	500	131	67	2	34	0.26

Table 7. (continued)

2005-06	577	263	88	7	54	0.46
Average	709	294	111	5	40	0.41

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, efforts are made to look for opportunities to minimize the dependency of elk on supplemental feed.

Several management decisions must be made annually on each feedground. Depending on the situation, some tactics may be implemented and others may not. Some management decisions are in direct conflict 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 goals may be given preference, this goal should be considered when making all decisions regarding the operation of feedgrounds. The degree to which this goal can be applied depends on the situation. Reducing the length of the feeding season is desirable when trying to reduce the spread of disease and feeding costs. The earlier that feeding can be terminated in spring, the greater the potential of reducing brucellosis exposure among elk.
2. Does the feedground assist in the efforts of the Department to prevent damage to private property? This is a primary function of feedgrounds. Without holding elk at these feedgrounds, elk can cause considerable damage to private property and increase the risk of transmitting brucellosis to domestic livestock.
3. What can be done to keep feedground operating costs as low as possible? The amount of hay fed (influenced primarily by the number of elk and length of the feeding season) represents most of the cost for 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 possible? This usually involves keeping the feedgrounds as large as possible and feeding on fresh snow as much as possible.
5. Attempt to feed at a rate that keeps the elk in good body condition where potential damage problems are not a concern. This level of feeding is less than what the elk can and will consume if offered more. Feeding should not be adjusted to maintain the livelihood of old and/or crippled elk. A good rule of thumb is to feed enough to keep calves healthy in early winter, then feed enough to keep pregnant cows in good nutritional condition during late winter. It is these two age groups (calves on the

feedground and those to be born in the spring) that are most susceptible to inadequate nutrition.

6. Attempt to feed at a rate that will satiate elk appetite when 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 damage on private lands and commingling with livestock).

Feedground Operation Plans

Green River Lakes

This is the northern most feedground on the western slope of the Wind River mountain range. The Green River Lakes feedground is on USFS property. This location is very remote (accessible only by a 15 mile snowmobile trip during the winter). Potential damage concerns are not a consideration at this location. This feedground serves primarily to prevent elk starvation in the Upper Green River area, and has been practiced for approximately 75 years. Snow depth accumulations here are less than at nearby locations and results in a relatively shorter feeding season. Also, several hundred elk (300-500) typically free range on Pinyon Ridge, which is a short distance from the feedground. The groomed snowmobile trail, used to access Green River Lake, passes through the feedground and can be a source of elk disturbance. Commission quotas allow for 675 elk.

Primary Management Issues

1. Enough hay should be stored at this location to handle maximum elk numbers for a long feeding season because of the remoteness.
2. Feeding practices should not entice free ranging elk in the area to come to the feedground, especially those on Pinyon Ridge.

Secondary Management Issues

1. Monitor snowmobile activity on and near the feedground and make an effort to keep disturbance to elk minimal.
2. Be aware that the feeder is isolated and that some method of monitoring safety and well-being should be employed.

Management Suggestions/criteria

1. Feeding at this site can be delayed without fear of elk causing damage or co-mingling with livestock. The decision to initiate feeding is usually based on snow conditions and forage availability. Feeding should begin when 100-200 elk begin spending most of their time on or near the feedground. Snow depths are typically 12 to 18 inches when feeding commences.
2. The elk will voluntarily leave this feedground in the spring as forage becomes available in surrounding areas, which will be reflective in reduced feed consumption on the feedground. When most of the elk have left, feeding should be terminated.

Black Butte

This feedground is situated on property owned by WGFC (645 acres) and is situated near the "Rim", where snow accumulations are relatively high during winter months. Feeding normally starts in November and usually continues until May. Elk have arrived at this feedground as early as September. During the late fall, elk from this feedground can easily cause damage problems. As snow depths increase, elk are dependent on supplemental feed, whether provided at the feedground, or from privately owned stored hay.

When the Commission acquired this property, a no hunting stipulation was included. As a result, the herd uses this land and the surrounding private land as a sanctuary and is increasing in size with little means of controlling the growth. The long feeding season results in high feeding costs, but provides limited hunting opportunity in and around the area. Commission quotas allow for 500 elk.

Primary Management Concerns

1. Feeding should begin early in the season to reduce the chance of elk leaving the area and causing damage. When elk leave this feedground, they move south to several private properties. Once they cross HWY 352, they immediately cause damage to stored hay and begin commingling with cattle. From here they will have to be hazed either to Soda Lake or back to Black Butte feedground by the WGFD.
2. Efforts should be made to re-negotiate and change the agreement that prohibits hunting on the land unit. The growing numbers of elk will increase the cost of operating the feedground, but will not offer any additional hunting opportunities. If the WGFD is expected to manage the herd unit based on population objectives, the increasing number of elk at this feedground will ultimately result in increased harvest of elk on native ranges and from other feedgrounds within the UGREH.

Secondary Management Issues

1. Wolf depredation on these elk may change the management of this herd considerably. Wolf activity has been responsible for moving elk from Black Butte to the Soda Lake feedground during two different years in the past.

Management Suggestions/criteria

1. Feeding should be initiated before the elk that are present on the feedground begin leaving in search of food. These elk will readily leave the feedground and ultimately cause problems for the Department and landowners.
2. Feeding can be terminated as soon as sufficient residual/new growth forage is available in the spring. It is unlikely that the elk will cause damage to private hay stores in the spring.

Soda Lake

This feedground is located on the WGFC-owned Soda Lake Wildlife Habitat Management Area (WHMA). A 25-mile elk fence passes along its southern and western edge and is an effective tool in keeping elk off of private property (Appendix 3). This

area also provides greater opportunity for elk to free range, especially during mild winters. Thus, feedground management can be directed toward minimizing intraspecific brucellosis transmission; the beginning and ending feeding dates can be altered to force more elk to free range. The Commission quota allows for 800 elk.

In 1992, the location of the feedground was moved a short distance to the east in order to keep elk off the areas that were adjacent to Soda Lake. Nitrogen levels in the Lake were higher than desired and elk feces were considered the source. Although the feedground and feeding sites were moved, a subsequent study showed that nitrogen levels in the Lake did not respond to changes in elk feeding practices.

Primary Management Issues

1. Feedground monitoring should be greater on this feedground than many others in order to maximize number of free-ranging elk, yet not allow them to leave the area. While enough native forage is available to provide adequate food for the elk in the early winter, the elk can leave via open gates and/or around the south end of the fence if not supervised.

Secondary Management Considerations

1. None.

Management Suggestions/criteria

1. The gates through the elk fence must be left open as long as possible to allow migrating deer to pass. The initiation of feeding can be delayed at this feedground until behavior and movement of the elk indicate that they are searching for food south and/or east of the feedground. At this time the gates should be closed and feeding started.
   Feeding can be terminated in the spring as the elk begin to move off the feedground in search of food. When this starts, the feeder can gradually reduce the amount of hay offered to the elk to encourage them to free range.

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 5 ongoing management activities: feedground elk vaccination, feedground management, habitat enhancement, elk/cattle separation, and brucellosis education. Goals established in 1989 were: 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 to 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

Green River Lakes Feedground

Elk were first vaccinated on the Green River Lakes feedground in 1986. In 2006, a total of 90 calves were vaccinated of 93 classified (97%) over a seven day period in early March. This is representative of vaccination efforts during past years on this feedground. The twenty-year total for doses administered is 1,954 for juveniles and 1,006 for adult females.

Black Butte Feedground

Vaccination was completed for the seventeenth consecutive year at this feedground. In 2006, a total of 246 juveniles of 168 classified (>100% coverage) were vaccinated over a 7-day period in late January, suggesting some yearlings received boosters. This is representative of vaccination efforts during past years on this feedground. Since 1989, a total of 2,878 juveniles and 909 adult females have been inoculated.

Soda Lake Feedground

Strain 19 was first administered at this feedground in 1992 with poor success. This winter, excellent results were achieved for the eighth consecutive year with 91 of 86 juveniles classified (>100%) being vaccinated over a four-day period during the first half of March. Since 1992, 1,532 juveniles and 821 adult females have been vaccinated.

Serology

The WGFD initiated brucellosis surveillance in elk on the Greys River feedground and National Elk Refuge in 1971 to monitor the distribution and prevalence of the disease. Currently, WGFD personnel trap, bleed, and test elk for brucellosis on four to five feedgrounds annually. A total of 3,971 yearling and adult female elk trapped on 19 different feedgrounds have been tested to date. Elk on the Green River Lakes feedground were tested in 1991, 1993, and 2003. Black Butte elk were sampled in 1989 and 2000, and Soda Lake feedground was tested in 1988, 1989, and 2006 (Table 9).

Table 9. Number of yearling, adult, and total females, and % seroprevalence of elk tested on the Green River Lakes, Black Butte, and Soda Lake feedgrounds as determined by the 4 standard tests and 4 standard with cELISA.

Feedground	YEAR	# Tested			% Seroprevalence	
		Yearling	Adult	Total	4 Standard	cELISA
Green River Lakes	1991	2	12	14	21%	*
	1993	1	8	9	33%	*
	2003	7	19	26	23%	15%
	SUM	10	39	49	**24%**	**15%**
Black Butte	1989	9	15	24	17%	*
	2000	9	25	34	21%	9%
	SUM	18	40	58	**19%**	**9%**
Soda Lake	1988	3	56	59	20%	*
	1989	4	14	18	0%	*
	2006	2	32	34	15%	15%
	SUM	7	70	77	**15%**	**15%**

*cELISA test not conducted

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). Sera that either produce a reaction on two or more of the tests, or if the CF test alone shows a reaction at a dilution rate of 2+ 1:20 or higher, are considered positive (Thorne et al., 1978). Once serostatus is determined using these criteria, another test dubbed cELISA (competitive enzyme-linked immunosorbent assay) is conducted on positive sera to differentiate between Strain 19 vaccine and field strain *Brucella abortus* titers. Seroprevalence only 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 feedground where Strain 19 elk vaccination is not conducted. Distribution data of elk from this feedground suggest relatively less interchange with surrounding feedgrounds, thus providing a control to compare elk vaccination efficacy with other feedgrounds through serology. Brucellosis surveillance was initiated on Dell in 1989, and has since been conducted from 1998-2005. Serology data using cELISA (Table 10) indicate brucellosis seroprevalence totals 30% (78 positives of 261 samples) on Dell Creek, and has fluctuated from 8% in 2004 to 50% in 1999. Seroprevalence data in this herd unit derived from the four standard tests and cELISA are limited, and more data are needed on all feedgrounds in the UGREH to accurately assess efficacy of the strain 19 vaccination program.

Table 10. Yearly and mean seroprevalence (number seropositive/total tested) as determined by four standard and cELISA tests on Green River Lakes, Black Butte, and Soda Lake feedgrounds.

Year	Dell Creek*	Green River Lakes	Black Butte	Soda Lake
1998	26%			
1999	50%			
2000	45%		9%	
2001	26%			
2002	35%			
2003	37%	15%		
2004	8%			
2005	18%			
2006	17%			15%
MEAN	**29%**	**15%**	**9%**	**15%**

*Control feedground where elk have never been vaccinated

Elk/Cattle Disease Transmission Reduction

Annually, WGFD personnel employ a variety of damage control techniques, besides maintaining feedgrounds, to keep spatial and temporal separation of elk and cattle. The WGFD has a long-standing practice of providing game-proof stackyard fencing materials 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 171 haystacks have been provided by BFH personnel to cattle producers in Lincoln,

Sublette, and Teton counties in western Wyoming specifically for brucellosis management. Approximately 35 of these have been delivered to producers within the UGREH.

In some instances, elk are hazed from cattle feeding sites. These animals are hazed from areas of conflict via snowmobiles or aircraft to WGFD feedgrounds. In other cases, when the aforementioned management actions fail to achieve desired results, hunting seasons are extended or kill permits are employed to remove problem animals. However, in the UGREH, no depredation hunts have occurred or will occur in the foreseeable future.

Since 1999, BFH personnel have monitored areas where elk parturition and cattle turn out dates overlap. 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 Federal land managers and grazing operators will be initiated to resolve elk/cattle interaction if and when conflict areas are identified. Currently, there are no areas in the UGREH where cattle turn-out dates overlap with WGFD delineated elk parturition ranges (Map 4).

E. Habitat Management Summary

The primary goal of the "Habitat" approach of the BFH program is to enhance transitional and winter elk habitat to minimize the transmission and prevalence of brucellosis in elk associated with feedgrounds. Manipulating decadent vegetation in areas near feedgrounds can increase the production and palatability of grasses while promoting new forb and shrub growth. When desirable forages are available, the dependence of elk on artificial feed will decrease, as demonstrated annually during the green-up. Shorter feeding durations and lower elk concentrations on feedgrounds, especially during the high transmission risk period, may decrease the probability of intraspecific brucellosis transmission events. Any reduction in length of feeding season, regardless of cause, will also reduce cost of feedground operation. For example, a 43-day reduction in feeding season length on Soda Lake feedground, attributed to mild winters and habitat treatments (See section on Soda Lake, pgs 32-33), from 1992-2005 as compared to years 1974-1991 has lead to an approximate $12,710 decrease in WGFD feeding costs for each of the last 15 years, saving WGFD an estimated $190,000 at Soda Lake feedground (Figure 1).

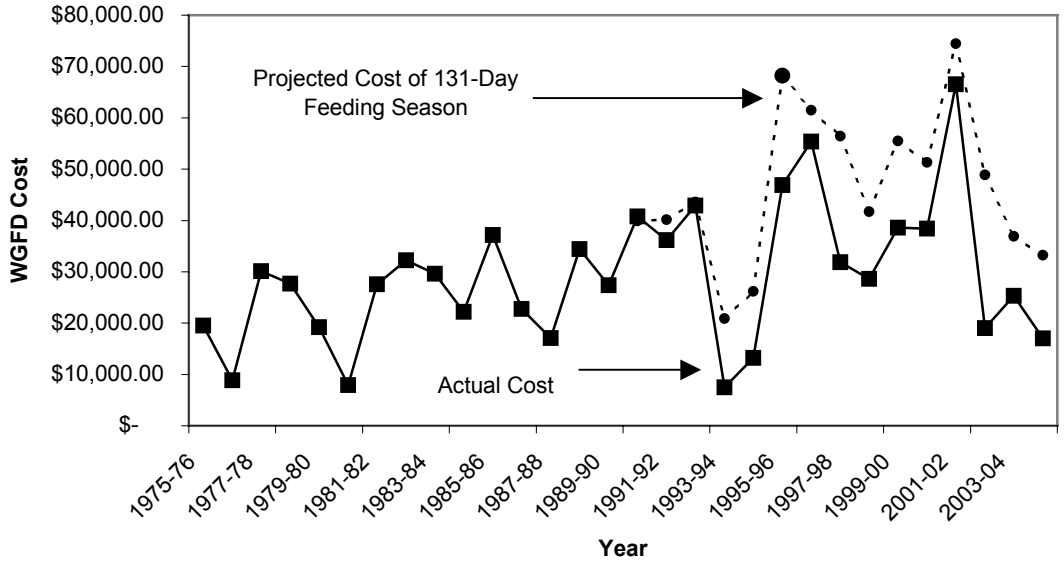


Figure 1. Actual WGFD hay expenditures for Soda Lake feedground from 1975-2005 (solid line) and projected costs from 1990-2005 (dashed line). Projected costs are an estimate of what WGFD would have spent on hay had the feeding season continued to average 131 days.

Elk and other wildlife habitats in western Wyoming have been modified through human fire suppression, urban expansion, oil and gas development, and other practices during the past century. Historically, disturbances, primarily wildfire, maintained the health and diversity of vegetative communities. Many vegetative communities, such as aspen, are dependant upon fire for regeneration. These communities have evolved with periodic disturbances, and in some areas fire frequency occurred on 20-30 year intervals.

Habitat enhancement projects can be employed to mimic natural disturbances and restore habitat to a more properly functioning condition. WGFD personnel work with other agencies to implement habitat enhancement projects that improve elk transitional and winter ranges. Habitat enhancement projects also create vegetative diversity, enhance aspen communities, and improve range conditions for myriad species. These projects involve identification of treatment areas, habitat inventory, implementation, and pre- and post-treatment monitoring.

Long-term WGFD feedground data can be used to assist in identification of areas where brucellosis management may benefit most from habitat treatments. The years from 1992-2005 can be characterized as relatively mild winters, whereas conditions in the previous years of 1974-1991 were more severe. The Soda Lake and Green River Lakes Feedgrounds having the greatest reduction in mean feeding season length during the mild years, suggesting a greater amount of available native forage during winter and/or a lower damage/commingling concern. Therefore, these locations should probably be the highest priority in implementing habitat treatments in E107 (see Figure 2). Near some feedgrounds, habitat treatments may be less effective for brucellosis management due to heavy snow conditions even during relatively mild winters, damage/commingling

risks, or post-treatment management regimes of the habitat enhancement area (*i.e.,* livestock grazing).

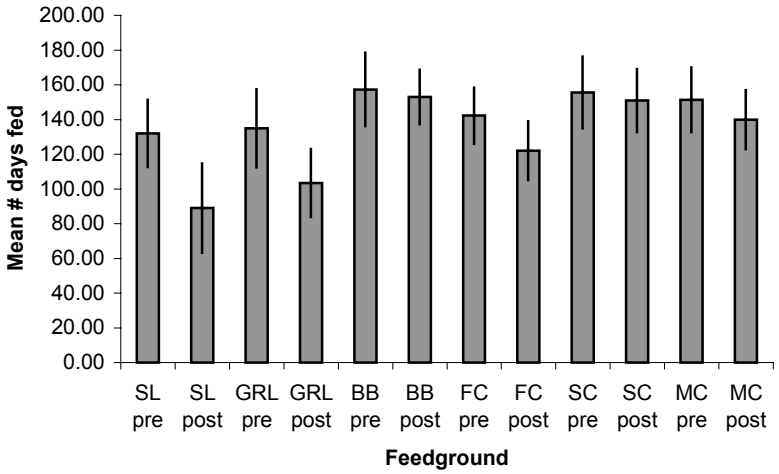


Figure 2. Mean length of supplemental feeding from 1974-1991 (pre) as compared to means from 1992-2005 (post) on the Soda Lake (SL), Green River Lakes (GRL), Black Butte (BB), Fall Creek (FC), Scab Creek (SC), and Muddy Creek feedgrounds in the Wind River Range (E107 and E108).

Numerous habitat improvement techniques can be utilized to increase habitat quantity and quality for elk and other wildlife. 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. Prescribed fire requires one season of rest from livestock grazing prior to treatment; all treatments require two growing seasons of post-treatment rest.

Prescribed, or human-controlled fire, works to mimic the natural occurrence of fire on the landscape and enhances habitat. Fire encourages growth of early successional plant communities preferred by elk and other wildlife. It is also typically the most cost efficient treatment type per acre.

Mechanical treatments involve the use of a "mechanical device" to manipulate vegetation. These devices usually involve some type of modified farm equipment such as a disc, half-round drum, ripper, or mower. Thinning and harvesting using chainsaws or a forward harvester (vehicle used to cut and move trees) may also be used. Mechanical habitat treatments promote herbaceous production, species diversity, stand rejuvenation, and elimination of select species.

Herbicide application may be used to reduce a particular life form (i.e., shrub) in order to increase the quantity and quality of another life form (i.e. grasses and forbs), subsequently diversifying plant communities. The herbicide "Spike" (Tebuthiron) can be used to reduce sagebrush density and increase herbaceous production. Herbicide treatments are sometimes employed in areas where prescribed fire is not an option.

Rest from livestock grazing is another type of habitat treatment that has received little attention in western Wyoming, but may provide a greater abundance of native forage for elk in exchange for payment to the willing permittee or landowner.

Several habitat enhancement projects have occurred within the UGREH on elk winter and transitional ranges. Most of these are associated with an elk feedground (Map 6). Table 11 lists habitat projects conducted within the UGREH since 1990 by treatment type. In addition, approximately 3,500 acres of wildfires have occurred within the UGREH since 1951 (Map 7).

Table 11. Habitat projects conducted within the UGREH

Prescribed Burns – 6,170 total acres treated at six locations.

McDowell Flats:	500 acres of sagebrush. USFS land
Soda Lake North:	1,800 acres of sagebrush/bitterbrush and aspen. WGFC and USFS land.
Little Flattop:	500 acres of sagebrush/bitterbrush and aspen. USFS land.
Fremont Ridge:	1,200 acres of sagebrush/bitterbrush. WGFC and USFS land.
Fremont Ridge II:	1,330 acres of sagebrush/bitterbrush and aspen. WGFC and USFS lands.
New Fork/Boulder:	840 acres of sagebrush and aspen. USFS land.

Mechanical (Cutting) – 80 total acres treated at one location.

Fremont Ridge II: 80 acres of aspen. WGFC and USFS land.

Total = 6,250 acres treated at 7 locations.

WGFD personnel 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 various plant attributes to assess habitat quality and monitor vegetation response pre and post treatment. Ideally, data from a plot located in a treated area (i.e., prescribed fire, etc.) 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 comparative information. Data collected from plots include one or several of the following: cover, shrub/tree density, shrub/tree age structure, forage production, species composition, and photographs. Below is a summary of habitat treatments that have occurred within the UGREH as associated with each feedground.

Green River Lakes

There have been no habitat treatments conducted in association with the Green River Lakes feedground. Quality and quantity if native winter range near this feedground should be of high concern, as this area supports the largest segment of free-ranging elk in the UGREH. Additionally, there has been a 31.5-day mean decrease in duration of the annual feeding season (Figure 2), suggesting a relatively large amount of available native forage.

USFS and WGFD have worked together for several years to plan the 32,000-acre Moose-Gyp series of habitat treatments in the UGREH (Map 8). Treatments could begin

in 2006 and occur over an estimated 10-year period. Approximately 21,000 proposed treatment acres are on Pinyon Ridge, a southwest-facing slope directly north of the feedground.

Black Butte

This feedground experienced a 4-day mean decrease in length of feeding season during the mild years (Figure 5). This is related to minimal forage availability during winter and damage/commingling concerns.

McDowell Flats Prescribed Fire. During the late 1980's, approximately 500 acres of sagebrush was treated with fire in the McDowell Flats area northwest of New Fork Lakes. The objective was to improve existing habitat conditions by reducing shrub cover and increasing herbaceous production. Field notes indicate this area receives heavy cattle use. Macroplots were read in 1995 and 1999, but not in 2004 because grasses were at minimal stuble height. Shrub recovery in this area continues to be slow (Table 12).

Table 12. Density of shrubs/hectare (ha) and cover estimates vegetation at a treatment site on the McDowell Flats up to 10 years post-treatment.

Location	Macroplot	Year	Cover			shrub
			% forb	% grass	% shrub	density/ha
Treatment	BBMF	1995	19	129	>1	560
Treatment	BBMF	1999	9	61	0	960

Production data collections began in autumn of 1995, but were not continued in 1999 or 2004 due to heavy livestock use. In 1995, herbaceous production was low at 290 kg/ha for grass and 120 kg/ha for forbs. This prescribed burn probably offered little to improve quantity and quality of wildlife forage or brucellosis management.

Little Flattop Prescribed Fire. In 1993, 500 acres of sagebrush/bitterbrush and aspen habitat were treated with prescribed fire. There were no pretreatment data collected at these sites (Table 13). The aspen treatment area is now dominated by young and mature plants with an aspen density of 20,000 stems/ha. Herbaceous production in 1998 was 637 and 1,323 kg/ha in aspen and sagebrush treatment areas, respectively. The effect this treatment has had on feedground elk is unknown. Some elk from Black Butte, and also Soda Lake feedground, use this area as transitional range.

Table 13. Vegetative cover estimates for treated areas within aspen and sagebrush communities in 1998 on Little Flattop.

Location	Macroplot	Year	Cover		
			% forb	% grass	% shrub
Aspen Treatment	SLLFA	1998	93	36	13
Sagebrush Treatment	SLLFS	1998	26	102	0

New Fork/Boulder Prescribed Fire. In spring 2004, 840 acres of sagebrush habitat was treated in the lake rim and in the Marsh Creek area of Boulder Basin north of New

Fork Lakes. This was part of a larger project that included a proposed 2,677 acres, including the treatment of a large portion of aspen stands. This project was scheduled for completion in fall 2004, but proper climatic factors for prescribed burning were not obtained. The project was pushed back to 2005. The remaining 69% of the project (approximately 1,837 acres) was subsequently cancelled, however, because the treatment area could not be rested the entire two seasons post treatment due to absence of an alternative cattle grazing area.

Soda Lake

More effort has been placed on habitat treatments near Soda Lake feedground than any other state-operated feedground (4,813 acres total; Map 6). Costs of implementing habitat improvements were approximately $133,550, mostly covered through grants and USFS budgets.

A simplistic approach to addressing impact of habitat treatments on elk dependency on supplemental feed using available data is by analyzing changes in feeding season length before and after treatment. However, there are many factors that may influence year-to-year fluctuation in length of feeding season. Most apparent is yearly climate change. Additionally, damage/commingling concerns may prohibit a decrease in feeding season length even though native forage may be available during mild years. In effort to evaluate the effects habitat treatments near Soda Lake may have on length of feeding season, comparisons can be made to the Green River Lakes feedground, where no habitat treatments have occurred. Both areas have relatively large space available for elk to free range during winter, similar snow levels, and low damage/commingling concerns. A paired T-test was conducted between yearly data on feeding season length from 1974-1991. If habitat treatments at Soda Lake have no effect on length of feeding season, the change/difference in mean pre and post-treatment length of feeding season should not be statistically different than data from similar feedgrounds. There was no difference between feeding season lengths on Green River Lakes and Soda Lake feedgrounds from 1974-1991 ($T=0.74$, $P=0.472$). The analysis repeated for years 1992-2005, after the initiation of the first habitat treatments near Soda Lake, showed that feeding season lengths were statistically different ($T=2.72$, $P=0.017$). Soda Lake feedground experienced a 43-day mean decrease in duration of the annual feeding season, which was 11.5 days more than the mean decrease at the Green River Lakes feedground. Habitat treatments near Soda Lake appear to have reduced dependency of elk on supplemental feed.

Soda Lake North Prescribed Fire and Mechanical Treatments. During 1990-93 several treatments were implemented north of Soda Lake, totaling 1,800 acres. The primary objective of these treatments was to promote regeneration of decadent aspen stands. Aspen inventories were performed in the stands treated in 1992. These inventories were conducted in the Soda Lake area for 8 years post treatment (2000) to evaluate stand replacement success. Five sites were inventoried that had either different post-treatment management (i.e., grazing) or a different treatment type (i.e., prescribed fire or mechanical). Two sites were located within the WGFC's Soda Lake Wildlife Habitat Management Area (WHMA), "Game & Fish Burn" (SLGFburn) and "Game & Fish Cutting" (SLGFcut). The remaining three sites were located on Forest and include

"Spring Creek Burn" (SLSCburn), "Forest Service Burn" (SLFSburn), and "Forest Service Exclosure" (SLEXburn). All of the sites, except the Forest Service Exclosure, receive fall/winter/spring use by elk and moose and some deer and pronghorn use during summer and transitional periods.

It may be risky to conduct aspen enhancement projects near elk feedgrounds that may receive a large degree of browsing pressure immediately post treatment. Over-utilization by large congregations of ungulates may limit or hinder aspen regeneration and long-term success. Aspen ecologists consider an aspen reestablishment successful when a density of > 1,000 stems/acre, >10 ft in height within 10 years post-treatment is reached.

The Soda Lake treatment had 8 years of recovery since implementation, so obtaining a tree density of 1000 stems/acre >8' would indicate a healthy recovery of aspen. Four out of the five inventoried sites exceed the density–height objective (1000 stems/acre >8'; Figure 3). Post treatment monitoring efforts suggested stands within these treatments were on their way to becoming "successful."

In 2004, browse throughout the recovery period of the treatment was estimated by counting the number of terminal bud changes in the life of the sucker/tree. This was repeated until a total of 100 aspen suckers were observed along each transect. Each transect was approximately 1/2 mile in length. The results indicate, as expected, that browse-use decreases as distance from the feedground increases (Figure 4).

The success of this treatment in close proximity to the feedground is probably due to the large area treated in a narrow time frame. Further research should address the size threshold that may separate successful from unsuccessful aspen treatments.

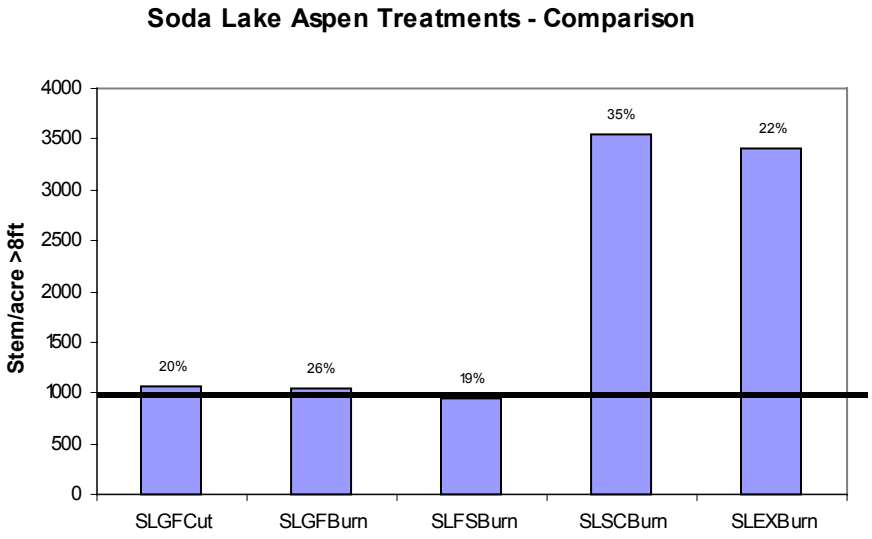


Figure 3. Soda Lake aspen densities >8' on five sites treated during 1992.

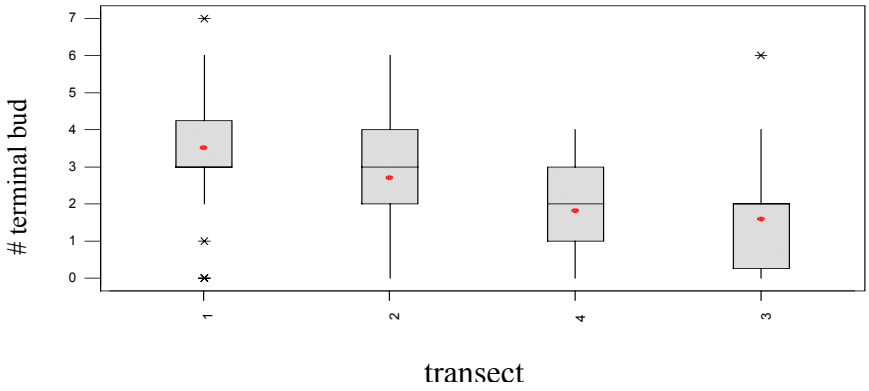


Figure 4. Estimated brows-use on aspen from 1 year post-treatment to May 2004 based on utilized terminal buds along four transects increasing in distance from the feedground at ½ mile increments, 1 through 4 respectively. The closest transect (#1) was 2 miles from the feedground.

Fremont Ridge Prescribed Fire. Fremont Ridge was treated with prescribed fire during 2000 and 2001. The objective was to improve existing conditions by reducing decadent shrubs and promoting new shrub regeneration while increasing grass and forb vigor and productivity. Data comparison from pre-treatment and two years post treatment show a 88% decline in shrub cover, 107% increase in forb cover, and a 144% increase in grass cover (Table 14). Additionally, a 75% increase in herbaceous production (1994 = 1,000 kg/ha; 2001 = 1,751 kg/ha) was observed.

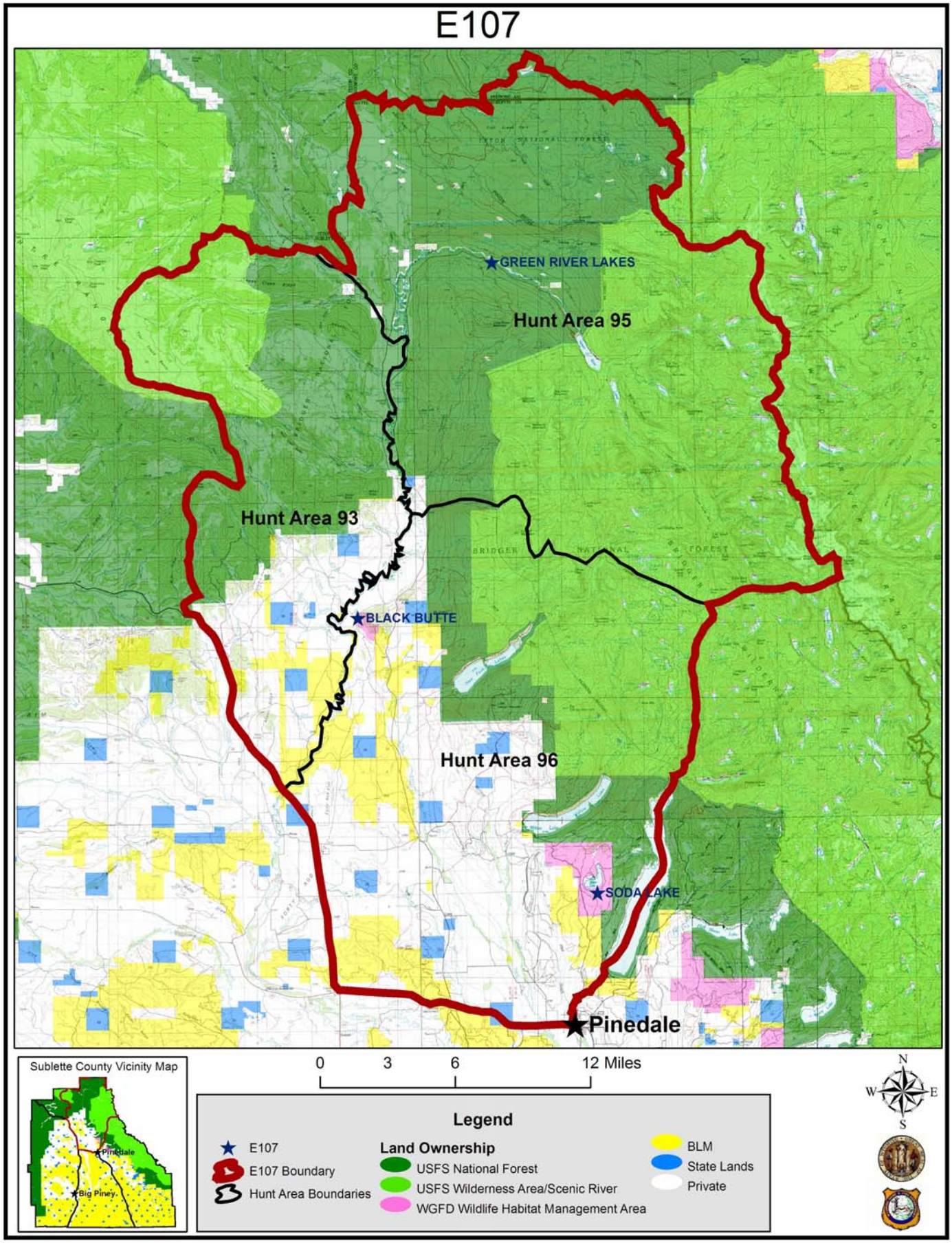
Table 14. Vegetative cover estimates pre- and post treatment on Fremont Ridge.

Location	Macroplot	Year	Cover		
			% forb	% grass	% shrub
Pre-treatment	SLFR	1994	15	27	26
Post-treatment	SLFR	2001	31	66	3

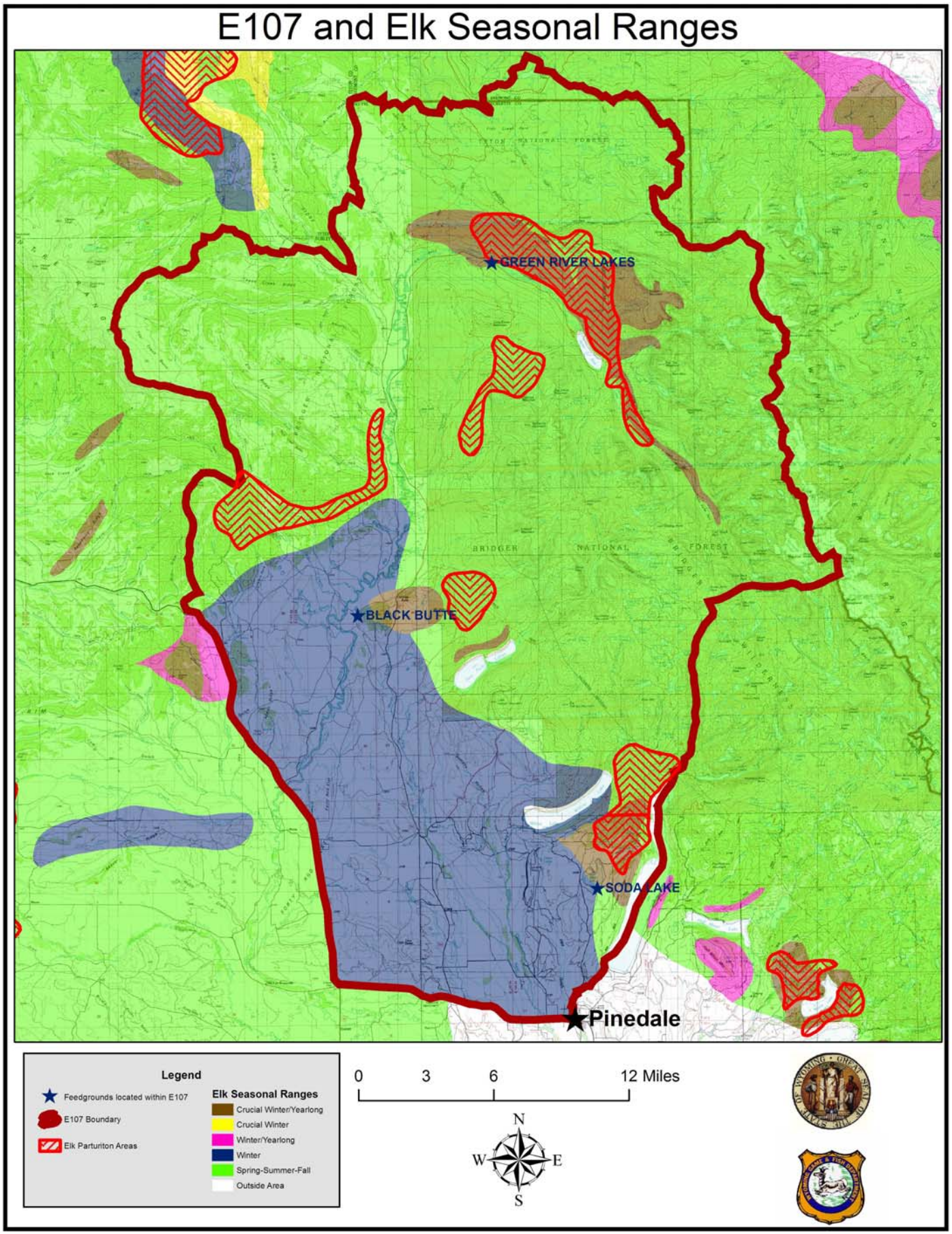
Fremont Ridge II Prescribed Fire. This 1,330-acre prescribed fire was implemented in fall 2005 on Forest (900 acres) and the WGFD Soda Lake WHMA (430 acres). The burn was postponed for two years because proper climatic conditions were not observed. In 2005, lack of additional space available for cattle grazing to provide adequate rest led to use of Half Moon WHMA as a forage reserve for cattle grazing. Monitoring of use limits outlined by WGFD was conducted by USFS and WGFD personnel. Proper grazing management (moving cattle) and limited grazing in riparian areas (electric fencing) was successful on Half Moon WHMA and thus grazing will occur again in 2006 to provide post rest to the Fremont II prescribed fire treatment. Pre-treatment data were collected and will be compared to post-treatment data collections beginning summer 2006.

Fremont Ridge II Mechanical Treatment. In 2001, approximately 80 acres of aspen were mechanically thinned with chainsaws to promote regeneration. Regeneration did not begin until 2003. This treatment occurred in several small, neighboring stands near the feedground. Heavy browse-use by elk has occurred on aspen suckers. The treatment will continue to be monitored but success will not be known for several more years. A ½-acre exclosure was established to aid in the monitoring of ungulate impact on aspen recovery.

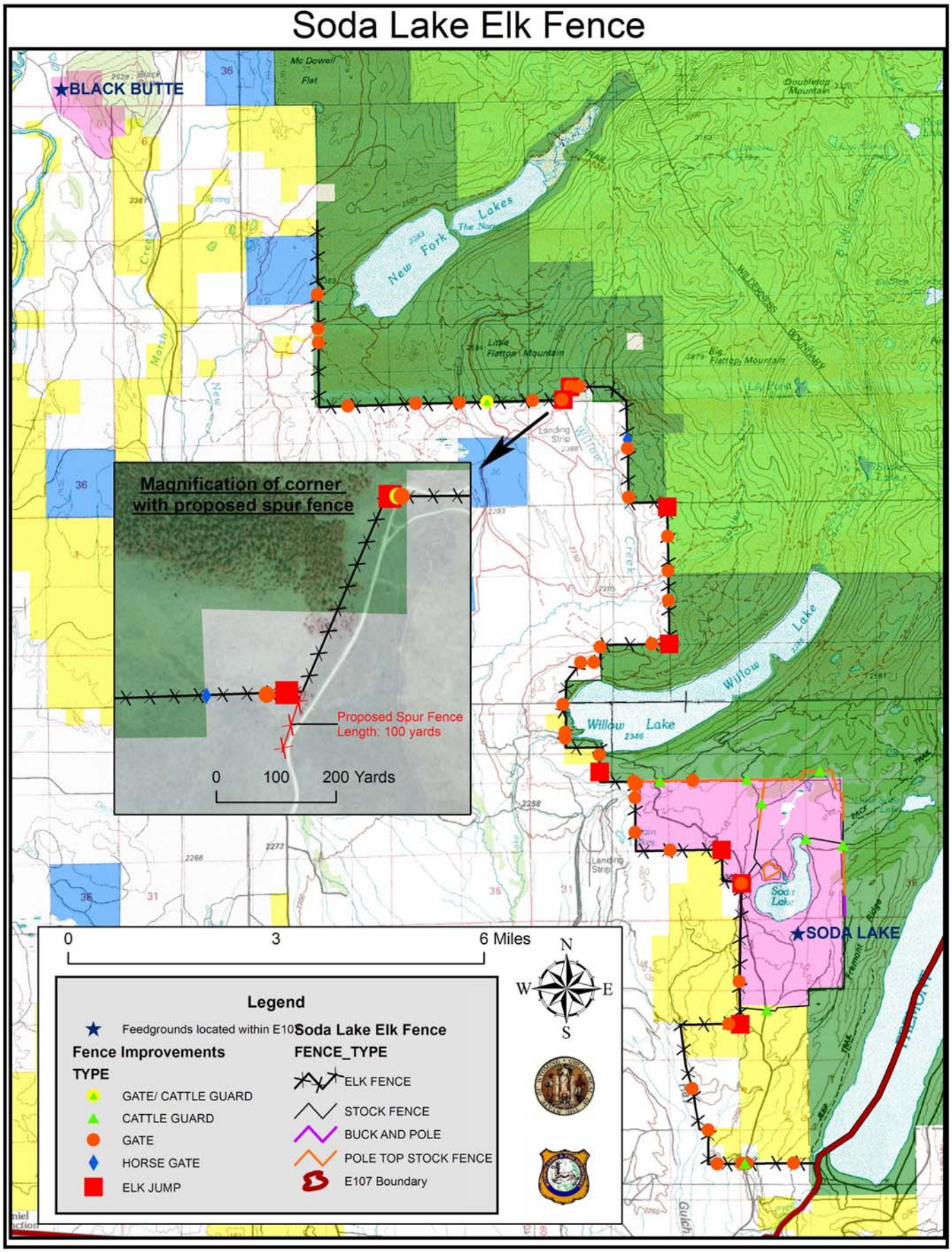
Map 1.


E107
GREEN RIVER LAKES
Hunt Area 95
Hunt Area 93
BLACK BUTTE
Hunt Area 96
SODA LAKE
Pinedale
Sublette County Vicinity Map
Pinedale
Big Piney
0 3 6 12 Miles
N
W
E
S
Legend
E107
E107 Boundary
Hunt Area Boundaries
Land Ownership
USFS National Forest
USFS Wilderness Area/Scenic River
WGFD Wildlife Habitat Management Area
BLM
State Lands
Private

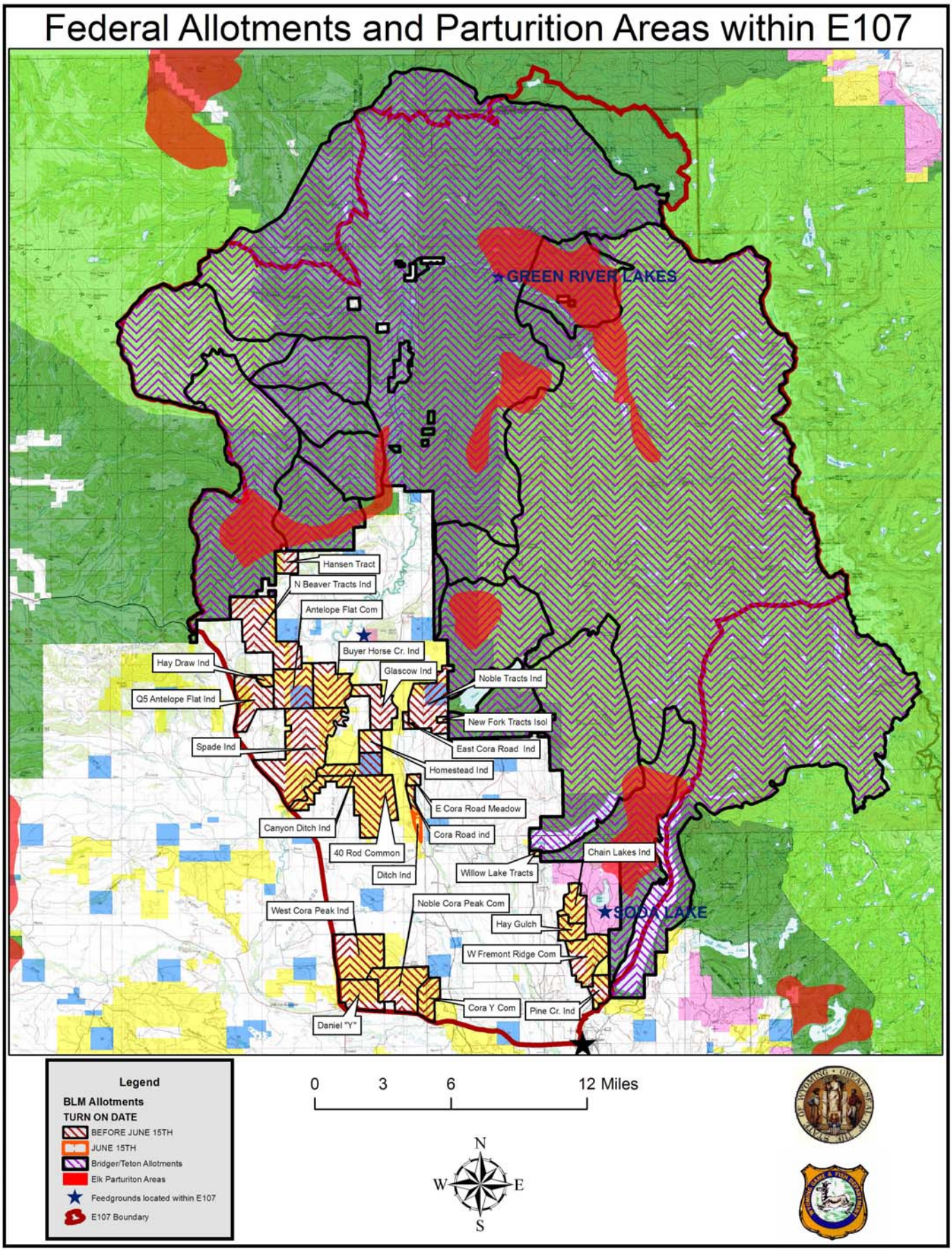
Map 2.


E107 and Elk Seasonal Ranges
GREEN RIVER LAKES
BLACK BUTTE
SODA LAKE
Pinedale
BRIDGER NATIONAL FOREST
Legend
Feedgrounds located within E107
E107 Boundary
Elk Parturiton Areas
Elk Seasonal Ranges
Crucial Winter/Yearlong
Crucial Winter
Winter/Yearlong
Winter
Spring-Summer-Fall
Outside Area
0 3 6 12 Miles
N
W
E
S

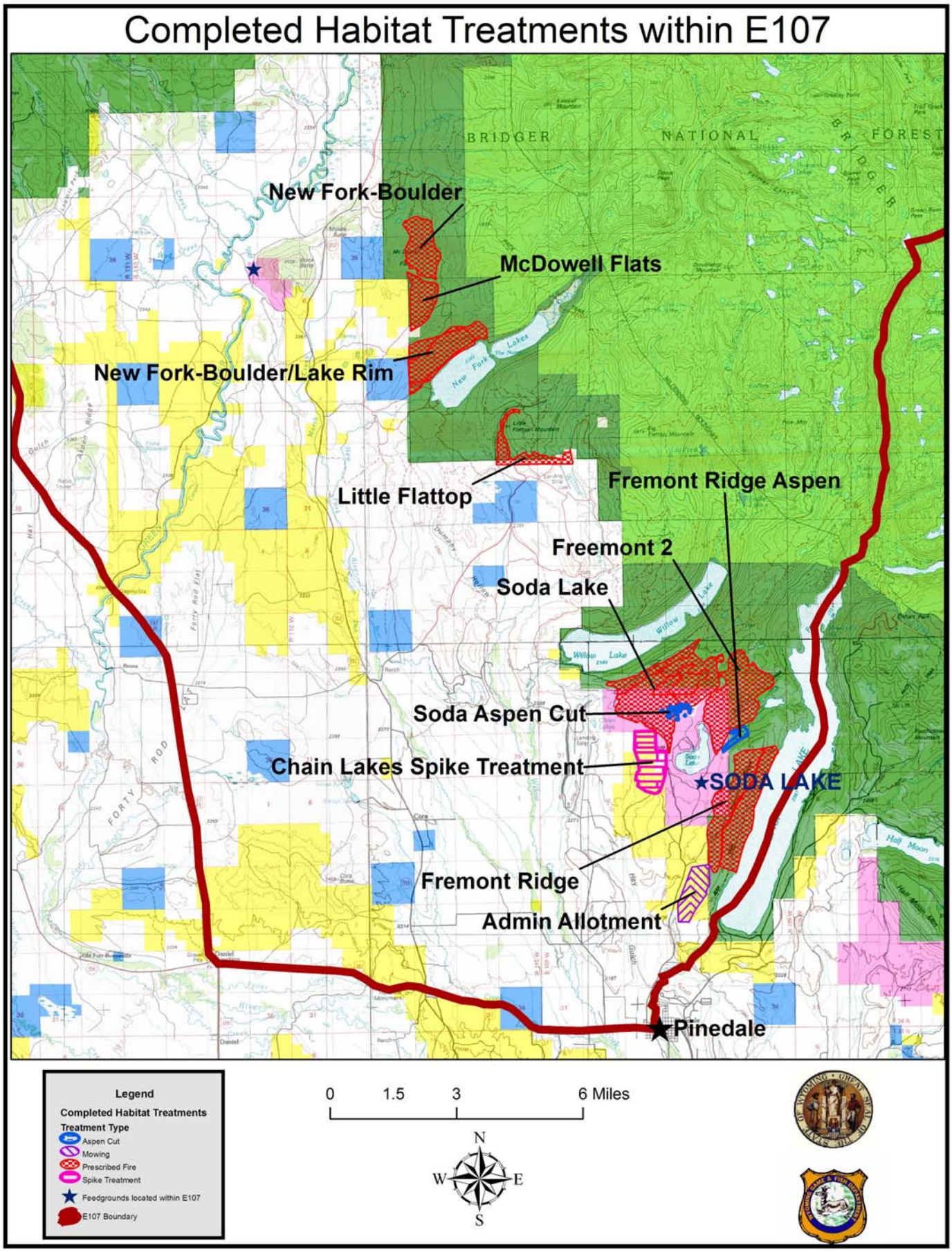
Map 3.


Soda Lake Elk Fence
★BLACK BUTTE
★SODA LAKE
Magnification of corner with proposed spur fence
Proposed Spur Fence Length: 100 yards
0 100 200 Yards
0 3 6 Miles
N
W
E
S
Legend
Feedgrounds located within E10
Soda Lake Elk Fence
Fence Improvements
TYPE
GATE/ CATTLE GUARD
CATTLE GUARD
GATE
HORSE GATE
ELK JUMP
FENCE_TYPE
ELK FENCE
STOCK FENCE
BUCK AND POLE
POLE TOP STOCK FENCE
E107 Boundary

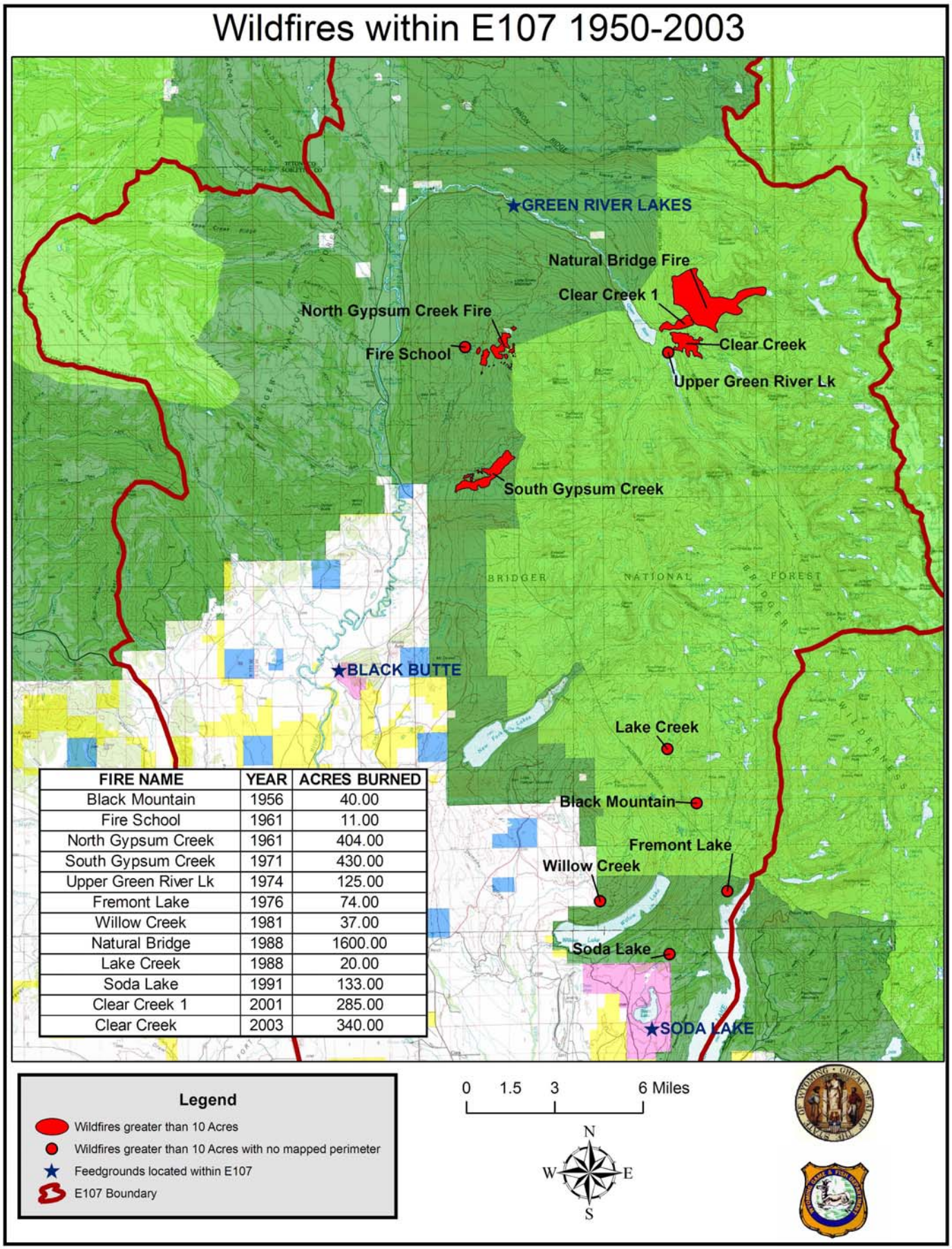
Map 4.


Federal Allotments and Parturition Areas within E107
GREEN RIVER LAKES
SODA LAKE
Hansen Tract
N Beaver Tracts Ind
Antelope Flat Com
Buyer Horse Cr. Ind
Hay Draw Ind
Glascow Ind
Noble Tracts Ind
Q5 Antelope Flat Ind
New Fork Tracts Isol
Spade Ind
East Cora Road Ind
Homestead Ind
E Cora Road Meadow
Canyon Ditch Ind
Cora Road ind
40 Rod Common
Chain Lakes Ind
Ditch Ind
Willow Lake Tracts
Noble Cora Peak Com
West Cora Peak Ind
Hay Gulch
W Fremont Ridge Com
Cora Y Com
Pine Cr. Ind
Daniel "Y"
Legend
BLM Allotments
TURN ON DATE
BEFORE JUNE 15TH
JUNE 15TH
Bridger/Teton Allotments
Elk Parturiton Areas
Feedgrounds located within E107
E107 Boundary
0 3 6 12 Miles
N
W
E
S

Map 5.

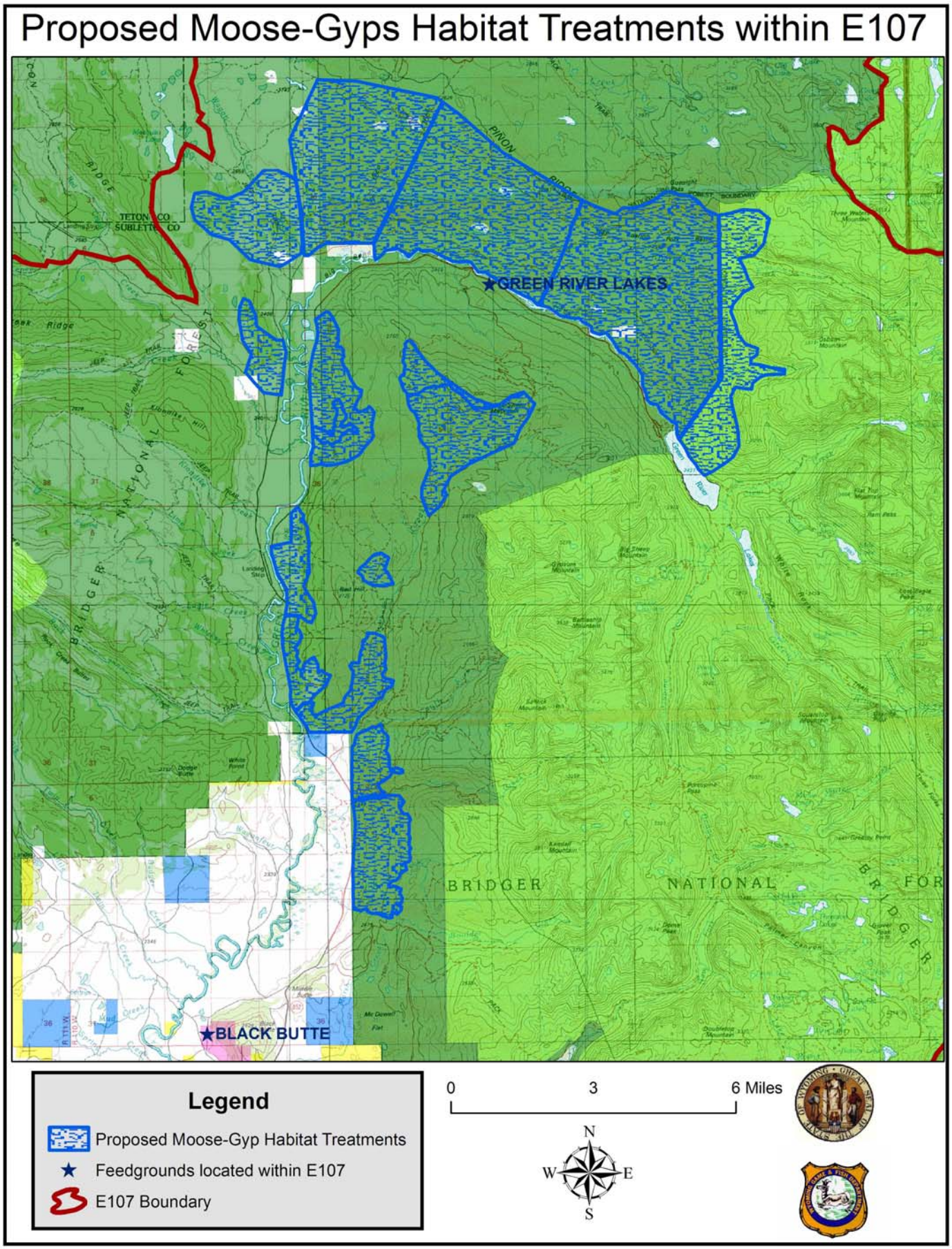

Completed Habitat Treatments within E107
BRIDGER NATIONAL FOREST
New Fork-Boulder
McDowell Flats
New Fork-Boulder/Lake Rim
Little Flattop
Fremont Ridge Aspen
Freemont 2
Soda Lake
Soda Aspen Cut
Chain Lakes Spike Treatment
SODA LAKE
Fremont Ridge
Admin Allotment
Pinedale
Legend
Completed Habitat Treatments
Treatment Type
Aspen Cut
Mowing
Prescribed Fire
Spike Treatment
Feedgrounds located within E107
E107 Boundary
0 1.5 3 6 Miles
N
W
E
S

Map 6.



FIRE NAME	YEAR	ACRES BURNED
Black Mountain	1956	40.00
Fire School	1961	11.00
North Gypsum Creek	1961	404.00
South Gypsum Creek	1971	430.00
Upper Green River Lk	1974	125.00
Fremont Lake	1976	74.00
Willow Creek	1981	37.00
Natural Bridge	1988	1600.00
Lake Creek	1988	20.00
Soda Lake	1991	133.00
Clear Creek 1	2001	285.00
Clear Creek	2003	340.00

Map 7.


Proposed Moose-Gyps Habitat Treatments within E107
GREEN RIVER LAKES
BLACK BUTTE
BRIDGER NATIONAL FOREST
PINON RIDGE
TETON CO
SUBLETTE CO
Legend
Proposed Moose-Gyp Habitat Treatments
Feedgrounds located within E107
E107 Boundary
0
3
6 Miles
N
W
E
S