WYOMING GAME AND FISH DEPARTMENT

Evaluation of a Proposal from the Wyoming Outdoor Council, Greater Yellowstone Coalition and Jackson Hole Conservation Alliance

for a Phase Out of Elk Feeding in the Gros Ventre

April 28, 2006

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The Wildlife Division has finalized a comprehensive assessment of the Wyoming Outdoor Council, Greater Yellowstone Coalition and Jackson Hole Conservation Alliance Gros Ventre Feedground Phase-Out pilot project proposal. Based on all the data reviewed, it appears the only way a trial phase-out of feeding could be attempted is if the current population of elk wintering in the Gros Ventre is reduced by 1,000 -1,500 animals, mitigation measures to prevent livestock and elk commingling are implemented by landowners in areas of highest potential for damage and commingling, and the National Elk Refuge (NER) agrees to accommodate any additional elk that could move from the Gros Ventre winter range to the NER.

The Wyoming Game and Fish Commission/Wyoming Game and Fish Department has the authority to unilaterally address only one of these factors, elk numbers wintering in the Gros Ventre. Any change in elk number objectives will require a public input process to discuss the issue and determine the level of support.

Based on this final assessment, the Wyoming Game and Fish Wildlife Division does not support a phase-out trial and firmly believes continuation of feeding is necessary to maintain elk management objectives and current elk hunting opportunities in the Jackson elk herd.

Sincerely,

Jay Lawson
Chief, Wildlife Division

EVALUATING A PHASE OUT OF ELK FEEDING IN THE GROS VENTRE

Introduction

This report examines the Gros Ventre River drainage as a winter range capable of supporting elk during the winter months without supplemental feed. This evaluation is in response to a proposal by the Greater Yellowstone Coalition, Wyoming Outdoor Council, and the Jackson Hole Conservation Alliance (referred to hereafter as NGO's) to phase out elk feeding in the Gros Ventre River drainage. Their proposal (NGO Phase-out Proposal) identified brucellosis in elk and livestock (Dorsey 2005, Roffe, 2005), susceptibility to other diseases, and monetary expenditures of the Wyoming Game and Fish Department (WGFD) (Roffe, 2005) as the justifications for the proposal.

Summer forage production and the number of elk that free ranged in the Gros Ventre prior to the late 1940's provide the rationale for the NGO's Phase-out Proposal. Other factors (elk behavior, elk migrations, social acceptance for elk numbers and winter starvation, commingling with cattle, standing and stored crop damage, etc.) also need to be considered and are included in the WGFD's assessment of the proposal.

This evaluation includes an objective, science based analysis of forage production and availability on the Gros Ventre winter range and an assessment of historic and recent observations of numbers and movements/behavior of elk using the Gros Ventre winter range. Projections of elk behavior, performance and movements in the Gros Ventre if supplemental feed was not available is based on the following factors: projected amounts of available forage, an assessment of historic and recent accounts of elk behavior, performance and movements with and without supplemental feed, and WGFD personnel experience managing feedground elk, including attempts to delay feeding. Due to the inconclusive data for several of the factors assessed, some level of subjectivity, based on professional judgment, is a part of this evaluation.

Area Description

The current Gros Ventre winter range designated by the WGFD during the 1980s encompasses 84,563 acres east of Grand Teton National Park (GTNP). The sagebrush vegetative type comprises about 36% of the total area. Coniferous forest types comprise approximately 43% of the area. Riparian plant communities comprise 7% of the area and montane meadow plant communities comprise approximately 6% of the designated winter range. The balance of the winter range includes aspen (3%), mountain shrub (3%), agricultural lands (1%) and unavailable areas such as rocks and water (1%) (Appendix 1).

In this document forage production and availability were calculated for the winter range currently documented on WGFD seasonal range overlays for the Jackson elk herd and compared to forage production and availability calculations for the geographic area where elk in groups of nine or more were observed during aerial surveys from 1999-2005 (50,193 acres) and the geographic area where all elk were observed during February surveys 1975 – 2005 (108,007 acres). The total area identified varied depending on the type of analysis and the methods utilized to record animal locations. Most of the Gros Ventre winter range varies in elevation from 7,000 feet to 9,500 feet.

Historical Perspectives

Caution needs to be used when interpreting historical data. Climatic conditions at the time of the counts and/or for the entire winter were not reported, both of which can have a significant affect on survey data. The time of year when the observations were made was commonly not reported and could have a significant bearing on the number of elk present, especially in migratory populations typical of western Wyoming, including the Gros Ventre. Descriptions of the area where count data were collected were commonly missing, and when mentioned, the description was too broad or vague to determine the actual geographic area being described. For example, some early references about the "Gros Ventre" appear to refer to the entire length of the river, which now includes parts of the National Elk Refuge and the

agricultural areas near East Gros Ventre Butte. Today, the "Gros Ventre" generally refers to that portion of the river drainage east of GTNP.

Methods of data collection during the early days were made without the aid of aircraft. Fixed wing planes were not used to count elk until 1931-32 (Hocker 1931-32). Individuals on foot made ground counts as late as 1948. Occasionally, observations made by private individuals were included in WGFD reports. Prior to the early 1960s ' the thoroughness of counts is also unknown due to the lack of supportive information about how and the exact area the counts took place. Additionally, some data seem unrealistic due to contradictory reports. For example, Cromley (2000) in a literature review reports one source as saying "thirty to forty thousand elk stayed in Jackson Hole in 1885-1890", yet other quotes say elk were so scarce that horses had to be killed for meat in December of 1876. Finally, unverified reports by individuals can be intentionally overstated or understated based on the individual's agenda. As a result of these factors, it often makes comparisons of historical data with modern data of limited value. It was not until the 1960's that regular data collection and reporting appeared and not until the mid 1970's that data were collected and reported in ways similar to today's methods.

In summary, since elk distribution/behavior in the Gros Ventre can be very dynamic, caution must be used when interpreting historical data and applying it to the modern situation. Historical data can probably be considered rough estimates, at best.

Historical Elk Populations. The Gros Ventre River drainage serves a number of functions in elk ecology. It can serve as winter range, transitional range, and as a migration corridor for large numbers of elk, all of which can introduce variation into elk distribution and abundance at any one point in time.

Many early sources (prior to 1900) report elk numbers for the Jackson area, but few make specific reference to the Gros Ventre. Casebeer (1962) cited a reference that indicated the elk population in the Gros Ventre was monitored as early as 1897. Anonymous (1921-22) reported that about 3,000 elk wintered in the Gros Ventre and that this area was one of the best winter ranges in Wyoming. The report also stated that if all livestock, except for local ranchers above Horsetail Creek, were removed, 2,000 more elk could winter in the Gros Ventre. Hocker (1932) in a report covering 1931-32, indicated that 4,995 elk wintered in the upper Gros Ventre (including Ditch Creek). Hocker (1933-34) reported a "careful estimate" made by the WGFD and ranchers figured 5,000 elk were in the upper Gros Ventre and Ditch Creek. Anonymous (1937) stated that 2,000 elk were fed in the Gros Ventre section, which may have included the NER. Brown (1947) reported 6,079 elk in the Gros Ventre in 1935. Anonymous (1938a) and Bagley (1941) reported that airplane counts in 1936 showed over 7,300 elk in the Gros Ventre. Anonymous (1938b) reported 3,726 elk in the Gros Ventre in 1938. Bagley (1941) reported 2,605 elk in the Gros Ventre in 1941. Prior to regular feeding, Anderson (1962) reported Gros Ventre elk populations varied between 2,273 elk and 9,128 elk. These estimates are shown in Figure 1, along with data collected in more recent years.

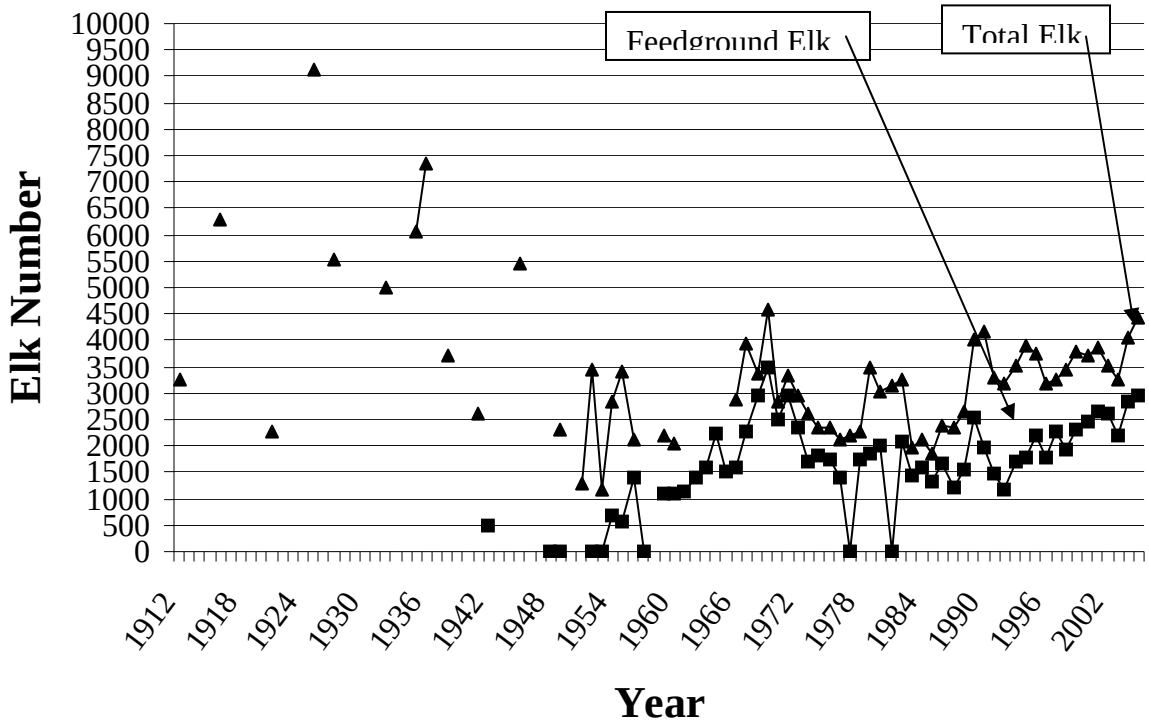

Figure 1. Total number of elk and number of elk on feedgrounds in the Gros Ventre River drainage, 1912-2004.

With the exception of 1938, the lack of detailed reporting between 1929 and the early 1950's does not allow for an accurate determination of the number of free ranging elk, or the number of elk being fed during that period. However, it is known that only minimal amounts of hay were fed and feeding did not occur every year until the mid-to-late 1940's, so the assumption is made that prior elk population counts/estimates probably referred to elk that relied primarily on native ranges.

Since nearly all the count data prior to the 1960s do not indicate the precise location of the counts, it is not known if the numbers include the lower Gros Ventre (below the Park boundary), Ditch Creek, etc., all of which could account for larger numbers of elk. The most detailed data appeared in Wyoming Wildlife (Anonymous 1938b). Data indicated that 3,726 elk were counted at specified locations in the Gros Ventre River drainage during the winter of 1937-1938, all of which were east of the GTNP boundary. Anderson (1958) presented data that showed an inverse relationship for elk numbers between the Gros Ventre and the NER. The 1938 count occurred in a year when the number of elk on the NER was 6,655 while in 1941 when elk numbers in the Gros Ventre east of the GTNP boundary were only 2,605, the NER supported 9,804 elk.

Elk counts reported for the Gros Ventre showed wide fluctuations prior to the mid 1940's (Figure 1). With the onset of regular feeding in the mid to late 1940's, total elk numbers appeared to stabilize. This may have resulted from less winter loss and/or more consistent observations from full time feeders living in the area. The total number of elk fed, increased during the 1950's and 60's and constituted a large percentage of the total Gros Ventre herd. An average of 3,172 elk have wintered in the Gros Ventre since 1975-76, ranging from 1,839 to 4,417 elk. Since 1975-76, an average of 1,823 elk (range of 0 to 2,941 elk) have been fed. The number of elk wintering on native ranges since 1975-76 is shown in Figure 2. An average of 1,348 elk (range of 501 elk to 3,142 elk) wintered on native ranges during that period. High numbers of elk wintered off feedgrounds in 1976-77 (~2,200) and 1980-81(~3,150). Snowfall these two winters was well below average. Pickup trucks could be driven to the Horn Place above the Fish Creek Feedground throughout both winters.

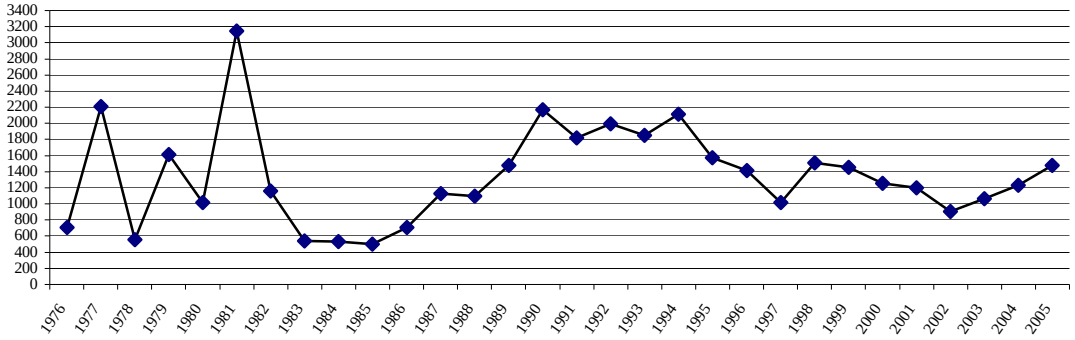

Figure 2. Numbers of elk on native ranges in the Gros Ventre since 1975-76. Population estimates between 1941 and 1975 are not shown because of variations in data reporting.

Starvation. The prevention of elk starvation was the driving force for supplemental feeding in the Gros Ventre. The value of the Gros Ventre River drainage for supporting large numbers of wintering elk has long been recognized (Anonymous 1938a). At the same time, large starvation losses were reported during winter months in the Gros Ventre. In 1929, the Gros Ventre, along with Greys River and Upper Green River were identified by the Department as areas where supplemental feed should be stored (Anonymous 1929-30). Existing literature that discusses other elk herds in the Jackson/Pinedale Region rarely mention starvation during the early years.

Anonymous (1927-28) reported that Gros Ventre elk normally winter in fair shape, but the winters of 1919 and 1926 were very severe and large losses occurred. Anderson (1958) reports elk numbers in the Gros Ventre were 2,273, 9,129, and 5,543 for the years of 1921, 1925, 1927, respectively. The very large variations in these elk numbers over relatively short time frames could reflect large starvation losses as reported, migrations out of the Gros Ventre, or unreliable counts. Hocker (1933-34) reported heavy winter losses in the Gros Ventre "in recent years". He also stated that losses were generally less on winter ranges than on feedgrounds, except for drought years where losses are very heavy, especially in the Gros Ventre. Anonymous (1938a) reported heavy winter kills during the winters of 1935-36 and 1936-37 in the Gros Ventre. Dutch Olsen (who owned property near the Fish Creek feedground) reported that 1,500 elk died by April 18 and more would die because of the failure of the feeding program (Anonymous 1938a). The Department responded to Olsen's claim and surveyed the area on horseback. A total of 573 dead elk (70% calves) were found (Anonymous 1938a). This apparently included all the Gros Ventre from Ditch Creek up drainage. Bagley (1937-38, 1941) also mentioned the losses in the Gros Ventre during the winters of 1937 and 1938. He reported losses diminished as the level of feeding increased over the years.

In 1988-89, 200-300 hundred elk spent the early part of the winter on Bacon Ridge and did not migrate down drainage because they were attracted to hay in a crib at a private holding above the Fish Creek Feedground. Not all elk had access to the hay because of limited openings in the crib. During this period, the elk fed on native ranges in the Gros Ventre River bottom and on Bacon Ridge (Ron Dean, personal communication, 2006). These elk eventually migrated to the Fish Creek Feedground and later, to the Cabin feedground. Many of these elk appeared malnourished and began dying in February. Elk feeders counted 76 dead elk on the Fish Creek and Cabin feedgrounds. Sixty-four of these elk were calves. Local outfitters video taped the dead elk in the spring and sent the tape to the Governor's office, blaming improper feeding.

Elk Movements. The number of elk counted on native ranges in the Gros Ventre at any one time can be highly variable because the drainage serves as both transition range and as a migration corridor. Snow conditions probably determine the number of elk that winter on native ranges in the Gros Ventre. Since snow and forage conditions were not reported, survey areas not delineated, and dates of the surveys not identified in most historical reports of free ranging elk, the data have limited value. Early observers thought that prior to 1913 elk migrated to the Green River Drainage but evidence for this migration is unsubstantiated (Cole, 1969). Even if it existed pre-1900s, given all the changes in land use in the Green River Drainage, it would be impossible to reestablish such a migration without major changes in current land uses, and even if these changes occurred there would be no guarantee this type of migration could be established. In 1911, some 36 years prior to the establishment of feedgrounds, E. Preble stated that," on the

other hand, the establishment of a second refuge in the Gros Ventre Valley would be comparatively inexpensive and would gradually be the means of detaining there in autumn a considerable number of elk that would otherwise keep on to lower elevations". With this in mind, data reported in Figure 1 indicates that as many as 9,128 elk may have wintered in the Gros Ventre. On the low end, Anderson (1962) reported that only 600 elk wintered in the Gros Ventre in 1954-55. Elk movements to the NER, or possibly other winter ranges, can explain at least part of this variation in the Gros Ventre. Based on marked elk studies very limited summer movement of elk from the Gros Ventre to the upper Wind River and upper Green River areas has been documented. These movements could only account for a very small amount of variation in number of elk wintering in the Gros Ventre due to the limited amount of movement that appears to occur among these three areas. Anderson (1962) reported an inverse relationship between the numbers of elk that winter in the Gros Ventre with those that winter on the NER. He also reported that about 2,800 elk left the Gros Ventre during difficult snow conditions in 1954-55 and that only 600 remained. Other indications of large elk movements can be seen in feeder reports from the Alkali feedground in the 1950's and 1960's (Table 1). This table shows increases in elk numbers that occurred after feeding had been in operation and cannot be explained by associated decreases in other feedground numbers. It appears that these were additional elk that migrated into the feedground from native ranges after spending much of the winter off feedgrounds.

Table 1. Elk movements to the Alkali feedground during the mid-winter months.

Feedground	Count (date)	Count (date)	Difference
Alkali-1956	500 elk (1/28)	800 elk (2/1)	+300
Alkali- 1963	400 elk (2/28)	900 elk (3/1)	+500
Alkali- 1964	450 elk (1/13)	1500 elk (1/14)	+1050
Alkali- 1968	970 elk (1/31)	1300 elk (3/1)	+330

Elk migration studies using neckbands and radio telemetry have also indicated movement out of the Gros Ventre and onto the NER (Figure 3). Some studies, *The Gros Ventre Cooperative Elk Logging Study* (1974-1979) and, *Movement, Distribution and Survival for Jackson Elk Herd, 2002-2005* indicate that 7% and 6%, respectively, of radio collared elk moved from the Gros Ventre to the NER in spite of efforts to prevent migrations to lower elevations (private property) by initiating feeding at the Gros Ventre feedgrounds. Since 1999-2000, elk have left the NER and wintered in the lower Gros Ventre. Also, elk neck banded at the NER have been observed in subsequent years on the Alkali feedground in the Gros Ventre. Other studies have shown similar movements of elk between the NER and the Gros Ventre. Elk in the Gros Ventre drainage summer at high elevation ranges on the Bridger-Teton and Shoshone National

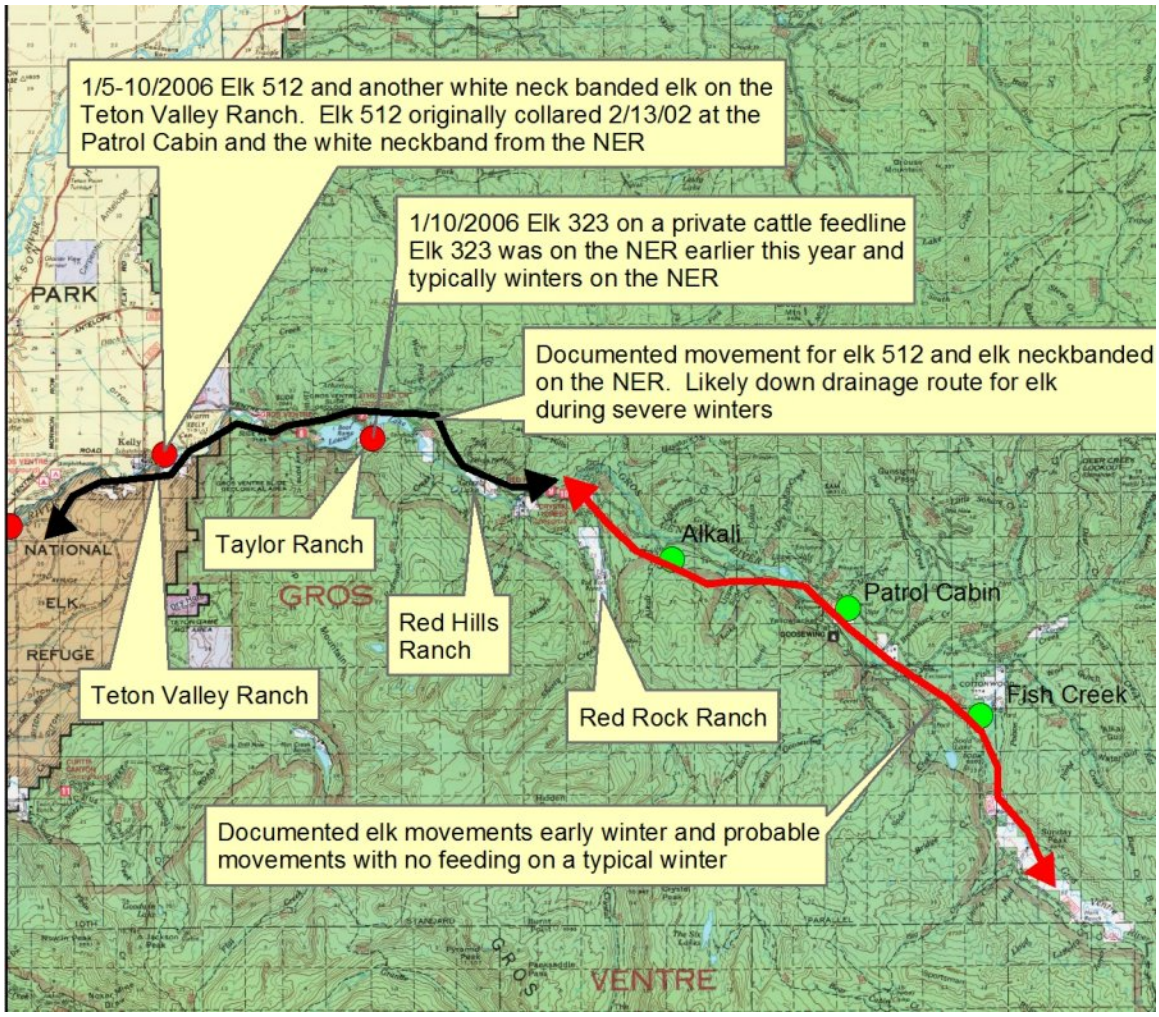

Figure 3. Documented elk movements and probable elk movements with no feeding in the Gros Ventre drainage.

Forest. The majority of these elk winter on feedgrounds in the Gros Ventre valley and the remainder use winter ranges in the drainage with some interchange from the National Elk Refuge. Smith and Robbins (1994) reported that 12 percent of the radio collared elk from the National Elk Refuge summered in the Gros Ventre herd segment of the Jackson Elk Herd. During this study they documented movements of elk that received radio collars on the NER. One of these elk later appeared on the Fish Creek Feedground, another wintered near Soda Lake, and a third wintered in Spread Creek. NER radio collared elk in the Gros Ventre exhibited an annual harvest rate of 36%. During the 2004-2005 winter, white neck banded elk from the NER were observed near Red Hills Ranch in the Gros Ventre during January. In 2006, a radio collared bull moved from the NER near the town of Jackson to private land at Lower Slide Lake in the Gros Ventre Drainage. Historical data (Anderson 1958) and recent observations (Figure 4) show that elk typically move in large herds.

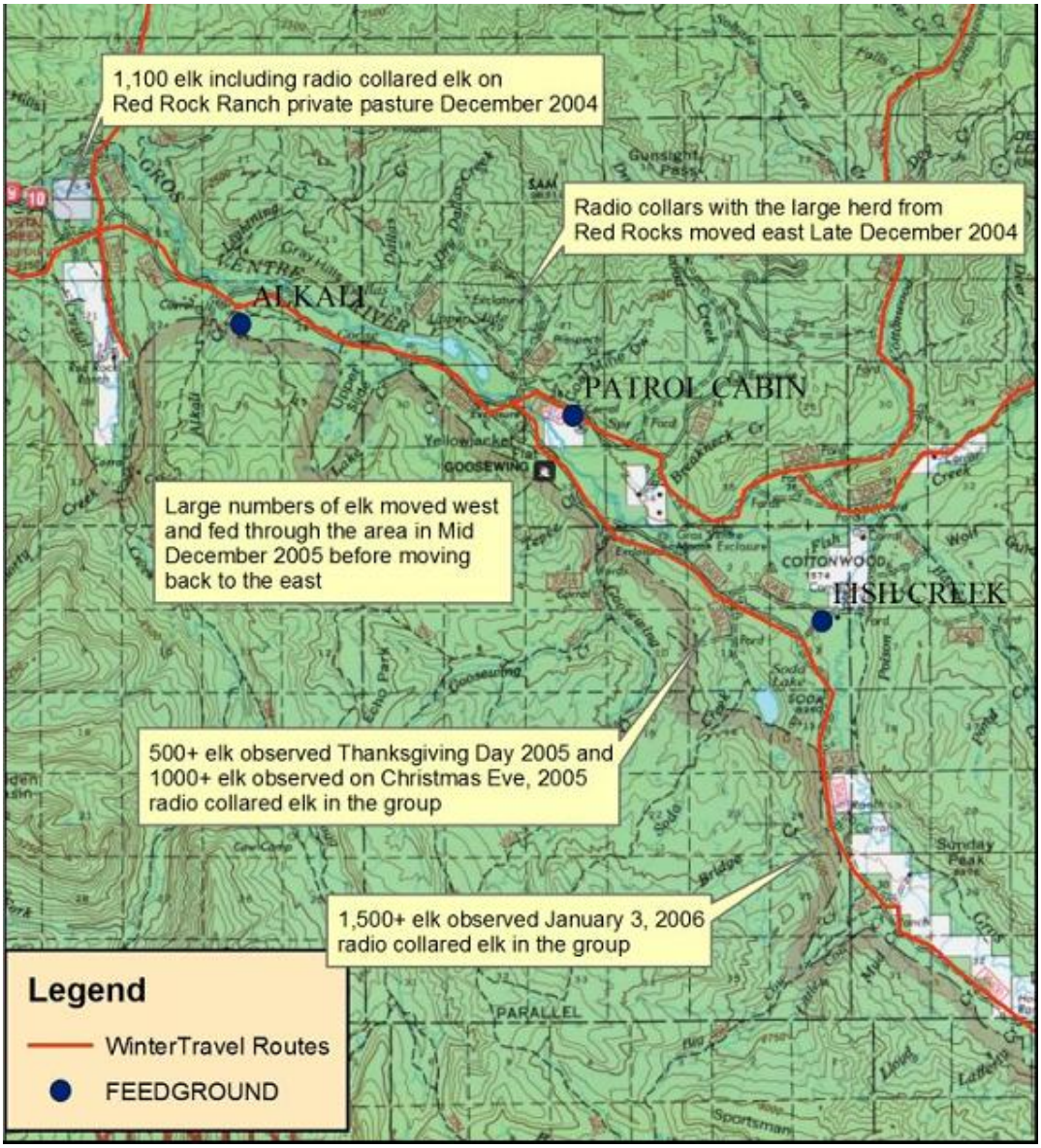

Figure 4. Elk movements prior to feeding in December 2004, December 2005, and January 2006.

Local movements of elk to lower elevations within the Gros Ventre occur each winter. Anderson (1958) observed the same movements. He reported on severe winters elk moved to the river bottoms where willow and cottonwood browse were available. Anonymous (1938a) reported elk moving to the river bottoms, where they foraged on willows.

Elk locations are influenced by several factors. Forage availability (forage production as influenced by snow cover) has a major influence on elk locations. Presence of feedgrounds, predators, human activity and , natural migration patterns all influence distribution and winter range use patterns. Elk migration patterns are very important in evaluating the NGO's Phase-out Proposal. Factors causing seasonal elk migrations have been the object of many studies. Snow depths exceeding 18-20 inches have been shown to induce elk movements to lower elevations (Thomas and Toweill, 1982). Other researchers have attempted to refine the causes of migrations. Seasonal migrations in the Jackson Elk Herd are influenced by snow accumulation in the fall and snowmelt in the spring (Boyce, 1989). It appears that the degree of icing and crusting is more important than snow depth (Anderson, 1958).

Damage. Damage prevention is a major concern because most of the private holdings are on or near the river bottom, which also serves as an elk migration corridor and provides winter forage to elk (Figure 3). Damage concerns along the Gros Ventre River date back at least to 1919-1920. Anonymous (1919-1920) reported that three damage complaints totaling $8,900 were made near Kelly. The lack of detailed reports between the 1920's and 1950's do not allow for an assessment of the damage situation during those years. Elk damage to standing and stored crops in the Gros Ventre occurred prior to the establishment of feed grounds and was partially responsible for the establishment of feedgrounds. The first known damage claim

in the upper Gros Ventre was filed in 1957, and was associated with several homesteads near the current location of the Fish Creek Feedground. Occasional damage has occurred on stored crops at the Goosewing private holdings. During the winter of 1968-1969, elk were fed at the Glenn Taylor Ranch adjacent to Lower Slide Lake to reduce damage problems. Pete Petera (personal communication 2004) stated that these elk could not be moved to the NER. Because of brucellosis transmission concerns, the Department has responded aggressively to prevent elk/livestock mixing since the early 1990s. Today, most of the concerns in the Gros Ventre are the result of commingling with livestock on feed lines on three ranches located on or below Crystal Creek (Figure 4). Elk depredations on feed lines and stored hay continue to concern ranchers. The Red Rock Ranch began claiming elk damage (elk on horse feed lines), beginning in the mid 1980s.

Elk were not fed at the Alkali Feedground during 2004-2005. The Red Rock Ranch experienced considerable damage to standing crops. A damage claim amounting to approximately $8,500 was paid for loss of fall pasture. Lasson (personal communication, 2005) also reported more elk on the Red Hills Ranch than in previous winters. Both of these locations are below the Alkali feedground.

Since 1957, approximately $68,000.00 has been paid to landowners claiming damage in the Gros Ventre drainage. In addition, countless hours are spent by WGFD personnel moving elk away from livestock feed lines to prevent damage and commingling and livestock operators are often faced with the problem of finding replacement forage for hay consumed by the elk. Some years replacement forage is not available so livestock operators have insufficient hay to meet their feeding needs. Costs associated with damage and commingling prevention average six to seven times the cost of damage payments each year, and this is with the current feeding program. Without feeding we would anticipate damage claims and damage prevention activities to be much higher. Many of those claims have been since the mid 1980s, amounting to 75% of all claims. These recent (since 1985) claims are for elk on livestock feed lines and elk utilizing fall pasture that would later be used for wintering livestock.

Livestock Use. In 1919, the Forest Service recognized the importance of the Gros Ventre drainage as big game winter range. With the exception of trailing, the 137,985-acre area in the Gros Ventre was declared closed to livestock grazing (Boyce, 1989). The Forest Supervisor's Order was not legally binding and subsequent Forest Supervisors opted not to adhere to it's original intent. By the 1960's and 1970's trespass cattle within the closure were frequent and deemed unmanageable. In 1973, a livestock grazing management plan was proposed for a portion of the closure to control livestock use. The grazing plan was eventually agreed upon by the WGFD and the US Forest Service and formalized by the Fish Creek Cattle and Horse Allotment Grazing Management Plan and associated Environmental Analysis Report. To clarify the parties concerns and expectations, a formal Memorandum of Understanding (MOU) was signed by the Bridger-Teton National Forest and the WGFD on 11 December 1979. The MOU emphasized limited livestock use of the Haystack and Breakneck Units of the Fish Creek Allotment by stating livestock use "…. shall only be made to the extent that no detrimental effect is made to the elk winter range habitat requirements, and that the integrity of the basic intent of the 1919 range designation of elk winter range be maintained. If irresolvable conflicts between big game and domestic livestock develop, removal of domestic livestock from these critical big game ranges will be required by the Bridger-Teton National Forest". In addition, it was agreed to establish long-term monitoring studies to cooperatively evaluate the effects and levels of livestock and elk use. Five trend transects were established shortly after the MOU. When last read in 1985, they indicated improved range conditions (Boyce 1989). Livestock numbers and animal unit months (AUM's), have decreased significantly over time within the Gros Ventre drainage. The average AUMs 1935-1941, for the three larger allotments, which overlap with important winter range, Fish Creek, Bacon Creek, and Upper Gros Ventre, were 8,247, 7,611, and 3,544 respectively. AUMs permitted for 2005 were 2,909, 2,748 and 2,053, respectively. Total AUMs issued for the three allotments between 1935 and 1941 were 19,402 and 7,710 in 2005. This equates to a 60% reduction in AUMs and approximately 5,261 tons of potential forage available solely for wildlife use.

Feedground Management. Elk have been fed at no less than 10 different sites in the Gros Ventre River drainage. Anonymous (1941-42) reported the National Elk Refuge Superintendent as stating that "our Department" started two feedgrounds near the Gros Ventre River in the upper portion of the Refuge to keep elk from private ranches (presumably in the Kelly area) and 483 elk were fed. Elk were fed at the Glenn Taylor ranch near the Lower Slide Lake during the winters of 1967-1968 and 2005-2006. The feeding sites at the Taylor Ranch and along the Gros Ventre near Kelly were temporary and in response to damage and

commingling problems. A permanent feeding site was established at the Goosewing Ranger Station in 1929 (Anonymous 1929-30). In 1933 and 1934, metal sheds (Hocker, 1933-34) were put at Goosewing and the "Rolling Hills" below Alkali (G. Taylor, personal communication, 2004). In 1936 or 1937 elk were fed at the mouth of Crystal Creek (Anonymous 1938a). In 1939, the Department bought the "Spaulding Place" near the mouth of Coal Mine Draw. The feeding site was then moved to the "Spaulding Place" from the Goosewing Ranger Station. This is the present site for the Patrol Cabin Feedground. In 1947, the feedground at the Rolling Hills was moved to a location about ¼ mile from Alkali Creek into the draw on the south side of the road. Also, during 1947, the Fish Creek Feedground was established. Finally, in 1970, the feedground below Alkali Creek was moved to its present location. The moves associated with this feedground were in response to increasing human activity along the Gros Ventre road.

The permanent feedgrounds were located in, or adjacent to, areas that probably wintered the most elk during the winter months, i.e., Bacon Ridge/mouth of Fish Creek, Goosewing area, and the Rolling Hills below Alkali Creek and lower Crystal Creek.

Few details are known about the actual feeding of elk in the Gros Ventre prior to 1949. It appears efforts to prevent starvation prior to 1949 were often inadequate and not always successful. Anderson (1958) stated that feeding in the Gros Ventre was done on an emergency basis and the number of elk fed remained small until 1956. This is supported by reports of elk starvation during this time period. Hocker (1933-34) reported that losses were greater on feedgrounds than on native ranges for years other than drought years. This suggests that feeding was not adequate. Documented mortality is less than 1% with the current feeding program. The amounts of feed stored also indicate that continuous feeding throughout the winter was not intended because very modest amounts were stored at the various locations. For example, in 1929, only 10 tons of concentrate was stored at Goosewing. Anonymous (1939-40) reported 15 ton of oil cake and 15 tons of hay were stored at Goosewing and 19 tons of hay and 15 tons of oil cake at Crystal storage shed in 1940. He also reported that 15 tons of hay were placed at "Colliers" (Patrol Cabin), 36 tons of hay and 35 tons of concentrate were placed at Alkali, and 18 tons of cottonseed cake and 36 tons of hay were placed at Goosewing. Further evidence that feeding was more "token" than "meaningful" occurred during 1938 when large numbers of elk died of starvation. During that winter, elk at Goosewing were only fed for 5 days (beginning April 11th) and elk at the mouth of Crystal Creek were fed for 9 days (beginning April 7$^{th)}$ (Anonymous 1938a). It appears that the efforts to prevent starvation intensified in the late 1940's. A cabin was built at Alkali for an elk feeder, hay was stored at Fish Creek, and the quantities of stored feed were increased significantly. Hanscum (1952) said 300 tons of hay was in the Gros Ventre ready for winter. The winter of 1958-59 began with 153 tons at Alkali, 33 tons at the Patrol Cabin, and 122 tons at Fish Creek.

Regular feeding began in the late 1940's, when a feeder lived in the cabin at Alkali and fed elk throughout the winter. During that same time period, a local rancher fed elk at Fish Creek. Documentation of feeding activities for the Patrol Cabin is sparse until 1958. In 1958, the Department hired a feeder to feed all three feed grounds. This feeder lived at the Patrol Cabin and used a "Bombardier" to feed elk at this location and to provide transportation to Fish Creek and Alkali. Feeding at Alkali and Fish Creek were done on alternate days. Daily feeding began in the mid 1960's. It was at this time when draft horses were used to pull feed sleighs.

Wolves. Wolves were introduced in Yellowstone National Park in 1995 and were first noticed by elk feeders in the spring of 1999 near the Patrol Cabin Feedground. In the winter of 1999-00 wolves became part of feedground management in the Gros Ventre. The presence of wolves in the Gros Ventre has influenced the number of elk on ranges adjacent to feedgrounds as well as the overall number of elk on feed. Since 1999 a trend toward fewer elk on native ranges adjacent to the feedgrounds has been observed while an increasing number of elk on feed has been observed during the same time.

Current Management Situation

Developments/Human Activities. Human activity levels in the Gros Ventre have changed a great deal since elk free ranged without feed grounds . Prior to the late 1940's, permanent winter residents were rare.

There is no evidence (damage reports, etc.) that cattle were fed in the Gros Ventre during the winter months, although there were active cattle ranches in the area. It is not known if cattle were moved from the area during the winter or if they remained in the Gros Ventre and elk damage was not reported and/or documented. Presumably, there was little or no winter travel in the valley floor. Bragonier (personal communication, 2005) stated that he was the only person living in the Gros Ventre above the Taylor Ranch during the 3 winters between 1958 and 1960. He also reported that he rarely had a visitor during the winter months. Today there are 7 permanent residents, 3 permanent livestock operations, and about 60 miles of designated snowmachine trails in the valley floors and through the designated winter range. USFS winter patrols encountered 20 people/day during the winters of 2001-2002. The Goosewing Ranch resort estimates they serve food to 10-100 snowmachine travelers each day.

Elk Distribution/Behavior/Forage Utilization. Reports from Anderson (1958) during the early 1950s indicated elk distribution was determined by forage availability. In the 1950s, elk went to the slopes and ridges that were blown free of snow. These elk typically stayed there until snow, ice or depleted forage forced them to lower elevations. On severe winters elk moved into the river bottoms where willow and cottonwood browse remained available. Some elk followed the river downstream. Anonymous (1938a) also stated that elk moved off the wind blown ridges into the willow bottoms, which was considered important to the survival of elk. In recent years Jackson/Pinedale Regional personnel have observed large groups of elk moving along the Gros Ventre River prior to the initiation of feeding. During the 2004-2005 winter, a group of 1,000 elk were documented moving from the bottom of Slate Creek back to the Patrol Cabin area prior to the initiation of feeding. This same movement pattern was observed in 2005-2006 when 1,000 elk began congregating in the Soda Creek area around Thanksgiving, 2005. This herd moved west to the ridge between Alkali Creek and the Red Rock Ranch. By January, the elk herd grew to 1,500 and they were observed 12 miles east of the Red Rock Ranch on Bridge Creek (Figure 4).

Since the late 1990's, wolf activity in the Gros Ventre has influenced elk distribution on and adjacent to elk feedgrounds. Elk on feedgrounds are often displaced to adjacent feedgrounds and as a result, elk numbers at a single feedground may double at any given time.

Damage Concerns. The Taylor and Robinson ranches graze horses, cattle, and raise hay for winter feed for these animals on their properties above the Fish Creek feedground Cattle are not currently wintered at these locations. Hay is produced, stored and fed to horses in the early winter. Both ranch operators move their animals off the upper ranches when snow conditions no longer allow the horse's access to forage and/or when hay supplies are depleted. The Goosewing Ranch feeds horses all winter. Even with the current feeding program damage/commingling occurs occasionally. However, feedgrounds have been effective in keeping most elk away from this location. In the absence of elk feeding, damage/commingling would likely occur more frequently and at a much larger scale with the current horse feeding operation.

Several livestock operations exist between the Alkali feedground and the NER in the lower Gros Ventre (Figure 3). The Red Rock Ranch is a mile west of the Alkali feedground. Hay is produced at this location for about 100 horses during the winter months. Most of these horses utilize pastures at other times during the year. Elk commingling with horses during the winter months has been a concern. A large elk proof fence was used to create a feeding area for the horses in 2004. This has prevented commingling, but damage by elk to standing crops still occurs. The Red Rock Ranch has had a cattle operation in the past. Cattle have not been part of the ranch operations in recent years, although the ranch still has summer Forest Service grazing permits available. The Red Hills Ranch is located near the mouth of West Miner Creek and raises registered Paint horses. Between 50-60 horses, including foals, yearlings, and brood mares are kept yearlong at this location. Commingling with elk occurs every winter at this location. The Taylor Ranch is located about 3 miles east of the GTNP boundary. Cattle are fed here during the winter months. Commingling with elk is common during the winter months. The Gros Ventre Valley Ranch is located adjacent to the GTNP boundary. When horses are fed at this location during the winter, commingling with elk occurs. This ranch did not retain horses in the winter of 2004-05 and 2005-06. The Teton Valley Ranch is located within GTNP near the town of Kelly and adjacent the to NER. Cattle are currently being fed at this location and commingling occurs. Other cattle operations exist in the Spring Gulch area (Jim Lucas, Russ Lucas, Brad Mead).

Damage/commingling concerns with breeding cattle operations still occur at the Taylor Ranch, Teton Valley Ranch, and in the Spring Gulch area despite the existing feeding program for several reasons. Elk migrating to or from the Gros Ventre pass near these locations. Hay on livestock feed lines is readily

available at these ranches. Elk distribution and radio collar data collected since 2000 suggest that recent efforts by the NER to delay feeding has encouraged elk to move from the NER into commingling/damage situations at these locations.

Current Feedground Management. Between 2,195 and 2,839 elk have been fed in the Gros Ventre since 2000-01. During mid to late October, elk begin congregating on the valley floor with some groups frequenting the Alkali and Patrol Cabin Feedgrounds. Feeding normally begins when large numbers of elk (500 +) have gathered in the valley bottom near the Fish Creek Feedground. The decision of when to initiate feeding each winter is based mostly on the location and movement patterns of the elk in relation to potential damage and commingling problems. Snow conditions also influence this decision. Elk group size is also considered when deciding how to spread elk between the three feedgrounds. Forage production and availability is rarely considered a factor when initiating feeding but forage availability does influence elk behavior, which is the primary factor for deciding when to feed or not feed elk.

Feeding at Alkali commonly begins when elk in the Alkali-lower Crystal Creek area have gathered in the bottoms and begin feeding on the meadows and/or cause damage to private property at the Red Rock Ranch. Also, feeding at the Alkali Feedground is started early enough to prevent elk movements down drainage where damage/commingling concerns exist at several locations (Figure 3). Little can be done to prevent damage/commingling if elk move below the Alkali feedground with the current livestock management situation.

Once feeding is initiated, elk generally stay at one of three feedgrounds unless wolves displace elk from the area. Wolves readily displace elk off the feedgrounds and all feedground elk invariably end up in 1 or 2 large herds. The location of these elk can change daily.

Normally, the elk will begin leaving the feedgrounds in March in search of feed on native ranges. Feeding is commonly terminated in early April when the snow has receded and enough residual/new growth forage is available to discourage elk from damage/commingling situations.

Prior to the introduction of wolves, approximately 1,400 ton of hay was stored at the 3 feedgrounds in the Gros Ventre. Wolves readily displace elk between feedgrounds and concentrate them into 1 or 2 large herds. Thus, it cannot be predicted where elk will ultimately need to be fed, requiring extra hay at all feedgrounds. An additional 400-ton has been place in the Gros Ventre since the introduction of wolves. Shed space exists for about 1,170 ton. This means that 630-ton sets unprotected from the weather at the beginning of each feeding season. Hay stacked outside suffers substantial loss of nutritional value from water damage after one or two winters.

Winter Range Acreage. The WGFD designated winter range totals 84,563 acres, last updated in 1987. This designation leaves out the Bacon Creek-Fish Creek area where elk typically winter and an area that will be included on the WGFD seasonal range overlay map in the next update. The NGO's Phase-out Proposal included this area, and estimated a total of 106,581 acres available for elk to winter on in the Gros Ventre drainage.

The locations of elk in relationship to the designated winter range in the Gros Ventre during February surveys are shown in Figures 5 and 6. Figure 5 shows elk locations from 1999-2005, which were recorded using GPS technology. Figure 6 shows elk locations observed from flights between 1975 and 1995 that were plotted on 1:126,720 scale US Forest Service maps and entered into the Wildlife Observation System (WOS) by ¼ section (or ½ section when elk were spread out). Data from these surveys show most of the elk observations are within the designated winter range, except for those in the lower Crystal Creek area and the Bacon Creek-Fish Creek area.

A Kernal Home Range Estimator (Beyer 2005) weighted by group size was utilized to identify key areas where at least 9 elk were observed at a time. In the analysis there were 118 groups totaling 301 elk (123 mature bulls, 49 spike bulls, 89 cows, 33 calves and 7 unclassified elk) observed from 1999-2005 outside the 95 percent weighted Kernal polygon. Single animals made up the majority of the groups left out of the analysis. The weighting was utilized to identify areas where groups of elk, nine or larger, were observed from year to year while leaving out areas where small groups were observed, during February. Approximately 50,193 acres were identified when elk group size was considered (Appendix 2). The acreage from this analysis represents where the majority of the elk are distributed at a time of the winter when forage and elk distribution is typically most limited.

An un-weighted Kernal Home Range Estimator was also utilized for all elk observed in February 1975 – 2005 in an effort to treat all elk groups independently. Treating groups of elk independently assumes that

the location of small groups or single elk are as critical as the distribution of large groups. This approach produced a winter range acreage estimate of 108,006 acres (Appendix 3).

Snow depths have been shown to induce elk movements to other locations (Thomas and Toweill 1982) but often crusting or water content are not quantified, both of which affect elk movement and behavior and forage availability. Elk movements and foraging behavior have been observed in relation to snow crusting (Anderson 1958, Bailey 1999).

A model developed by M. Coughenour and P. Farnes for Grand Teton National Park (Farnes et al 1999) predicted temporal and spatial variation in snow water equivalents (SWE). The model utilized three primary data sources: a digital elevation model (DEM), data on vegetation distribution, and point data on snow distribution. Slope and aspect were also used to readjust the model due to differential melting and associated snow depths. At the time WGFD managers felt that the model over estimated SWE levels for the Gros Ventre drainage because it did not account for the snow shadow effect downwind of the Teton and Gros Ventre ranges. Additional data were collected from sites in the Gros Ventre to enhance the model's accuracy.

As SWE increases, forage becomes less available and elk distribution changes. Hobbs et al (2003) reported the SWE and forage availability relationships based on studies conducted by Farnes et al (1999) in the northern range in Yellowstone National Park (Table 2). Generally, 1-2 inches of SWE were enough to initiate migration of at least part of the herd to lower elevations or areas with less snow and generally elk foraged only in areas with less than 6 inches of SWE.

Although additional data points were included from the Gros Ventre, the SWE determinations made by Farnes et al. (1999) may not be accurate. Table 3 shows that 65% of elk observations made from 1999 – 2005, during WGFD aerial elk surveys, occurred in areas where the Farnes model estimated SWE exceeded 6 inches. Forage is not available to elk in areas with greater than 5 inches SWE according to the model. It appears Farnes SWE model as applied to the Gros Ventre winter range needs considerable refinement.

Table 2. Percent of forage considered available to ungulates in the Greater Teton Ecosystem, Wyoming as snow water equivalents (SWE) increase (Hobbs et al, 2003).

SWE (inches)	Available Forage (%)
0	100
1	100
2	100
3	75
4	50
5	25
6+	0

Table 3. SWE measurements in the Gros Ventre in relation to elk observations from 1999-2005.

Gride Code(SWE)	# of obs in code	Total # of animals in obs
0	16	60
1	1	1
2	1	11
3	36	348
4	87	1221
5	117	1547
6	167	2045
7	111	1578
8	71	826
9	49	551
10	15	109
11	11	108
12	3	28
13	3	12
14	1	6

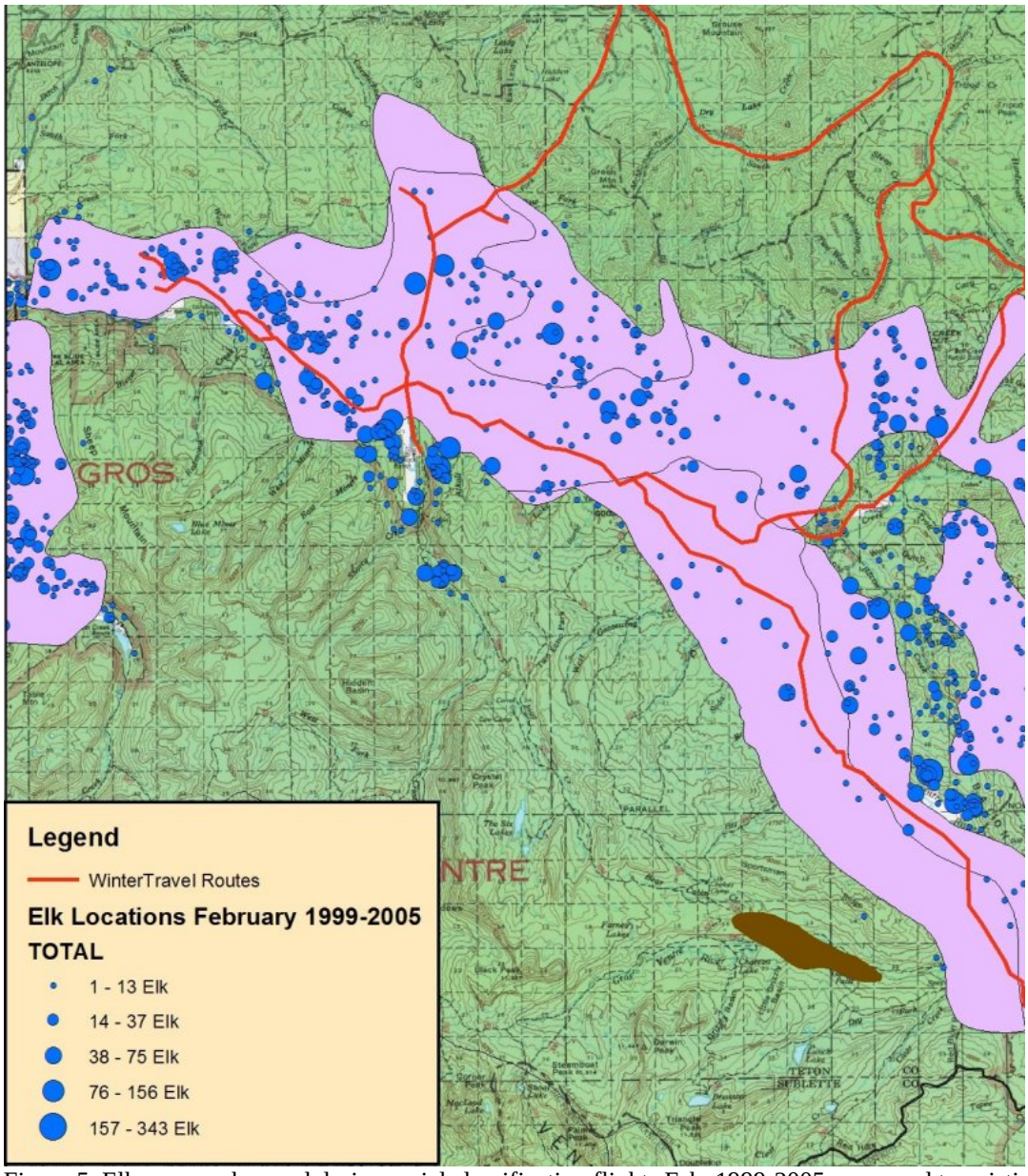

Figure 5. Elk groups observed during aerial classification flights Feb. 1999-2005 compared to existing crucial winter and winter range as designated by the WGFD (1987).

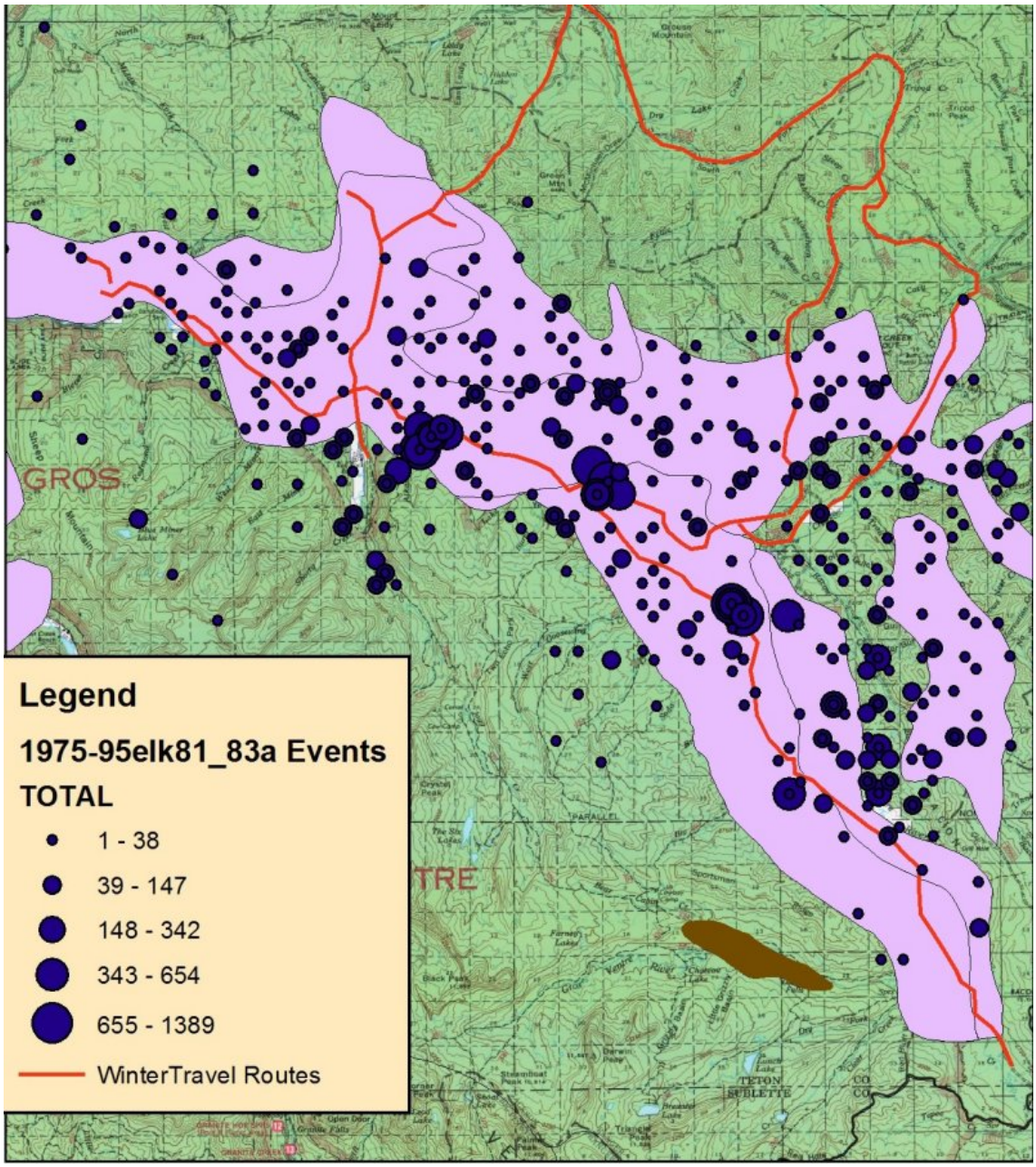

Figure 6. Elk observations from February Classification flights 1975 – 1995 compared to the Wyoming Game & Fish Department designated winter range.

Carrying Capacity. Determining a winter carrying capacity for elk in the Gros Ventre is extremely difficult. Forage production ends late each summer when most plant growth stops. A carrying capacity estimate must account for all factors that affect the availability of this forage until new growth begins 7-8 months later. Total forage production for the various vegetative types is shown in Appendix 1.

Various attempts have been made to investigate carrying capacity in the Jackson area (Murie 1944, Bailey 1999, Hobbs et al. 2003). None of these were specific for the Gros Ventre. Dorsey (2005) in the NGO Phase-out Proposal made a series of assumptions and calculated a carrying capacity for the Gros Ventre (Appendix 4). Dorsey estimates that forage was available for 4,419 elk for 6 months on 1/3 of the

existing winter range. Terrestrial Habitat Biologist, Steve Kilpatrick, WGFD, utilized data for SWE's and from a variety of other sources and calculated carrying capacities for elk in the Gros Ventre with various criteria (Appendix 5). These estimates indicate that carrying capacities during wet years varied between 5,063 elk and 11,463 elk for 183 days. Carrying capacities for years of mean precipitation varied between 3,375 elk and 7,641 elk for 183 days. The carrying capacity estimates during dry years varied between 1,519 elk and 3,440 elk for 183 days. Table 4 compares actual counts by Anderson (1958), to carrying capacity estimates from Dorsey (2005) and the three WGFD estimates utilizing current designated winter range, 1975-2005 February elk observations and 1999-2005 February elk observations. Results indicate that forage production and availability, is sufficient to support existing winter elk numbers in the Gros Ventre except in dry years. However, the most conservative carrying capacity estimate does suggest, even in an average precipitation year, forage may be limiting. The effects of snow crusting, which is not accounted for in any of the carrying capacity estimates, can significantly affect the availability of forage regardless of snow depth.

Table 4. Comparison of actual elk counts by Anderson (1958) and carrying capacity estimates for Dorsey (2005) and for the three WGFD estimates utilizing current designated winter range, 1975-2005 February elk observations and 1999-2005 February elk observations.

Source	Carrying Capacity/Actual Counts			Acres Analyzed	Acres with 0-5" SWE	Comments
Anderson (1958)	Mean = 4,427 Range = 692 - 9,128 Note: Actual counts			Gros Ventre Drainage - Acres Unknown	NA	Observations from 1912 - 1956 - Prior to routine feeding
Dorsey (2005) - used current WGFD Winter Range	4,419 (With 60% utilization)			103,704	35,454	Used 1/3 of WGFD WR for Forage Production - 35% unavailable on the 1/3 - Used Dry Yr Prod from Hobbs
	Mean	Wet	Dry			
WGFD(2006) -Current Winter Range - 0-5" SWE	6,422	9,634	2,891	84,564	28,201	8,179 acres were not included in the analysis due to lack of veg. coverage
WGFD (2006) -Feb 1975-2005 Observations - Kernal HR Estimator not weighted - 0-5" SWE	7,641	11,463	3,440	108,007	34,441	3,843 acres were not included in the analysis due to lack of veg. coverage
WGFD (2006) -Feb 1999-2005 Observations - Weighted Kernal Home Range Estimator - 0-5" SWE	3,375	5,053	1,519	49,926	16,008	267 acres were not included in the analysis due to a lack of veg. coverage

Landowner Tolerance. Landowner tolerance for elk on the private property that is not utilized for homes or agricultural purposes appears acceptable at this time. There have not been complaints concerning the presence of elk on these properties. Landowner tolerance for elk on properties utilized for agricultural purposes and/or livestock feeding is very low, especially when elk damage and/or commingling occur.

Big game Competition. Bighorn sheep and moose occupy wintering areas that overlap with elk. An analysis utilizing a kernal home range estimator on moose observations collected between 1999-2005 indicate that elk could potentially overlap with moose on approximately 23,549 acres (Figure 7). From 1999 –2005, an average of 145 moose utilized the same winter ranges as elk. Bighorn sheep are generally confined to winter ranges that provide steep escape terrain in the Gros Ventre drainage. A home range analysis of bighorn sheep observations collected between 1998-2005 using the kernal estimator indicates range overlap may occur between elk and bighorn sheep on approximately 9,817 acres (Figure 8). An average of 130 sheep are observed in the overlap area.

Generally, bighorn sheep occupy more rugged terrain than elk but areas of potential winter range overlap do occur in the lower Gros Ventre. Food habit studies from the literature demonstrate a high

potential for diet overlap between these two species. Interactions between elk and moose are not likely to be serious during the summer months, but on winter ranges, moose and elk can compete significantly for browse forage.

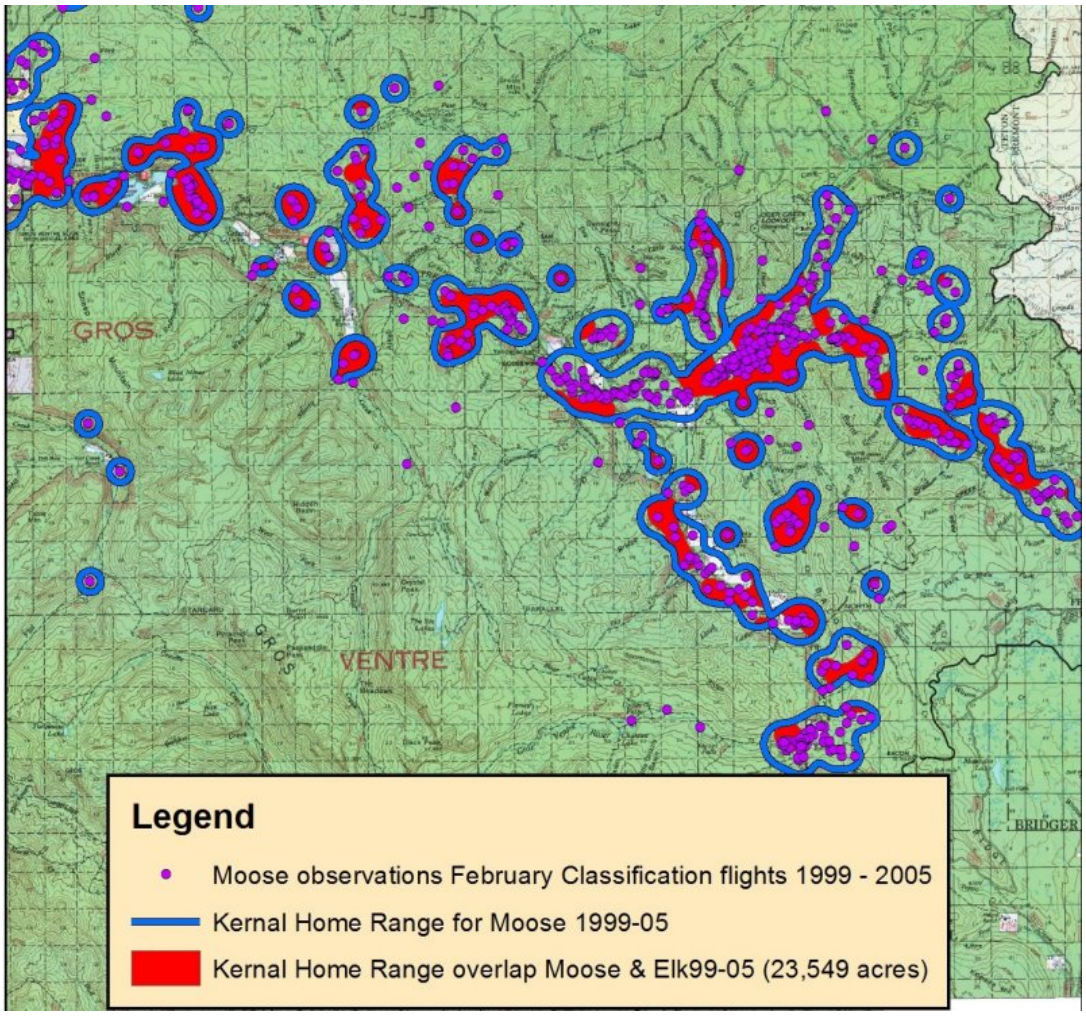

Figure 7. Moose observed during aerial classification flights Feb. 1999-2005 along with a 95% Kernal Home Range Estimator and the overlap of the ranges identified the Kernal estimator for both elk and moose.

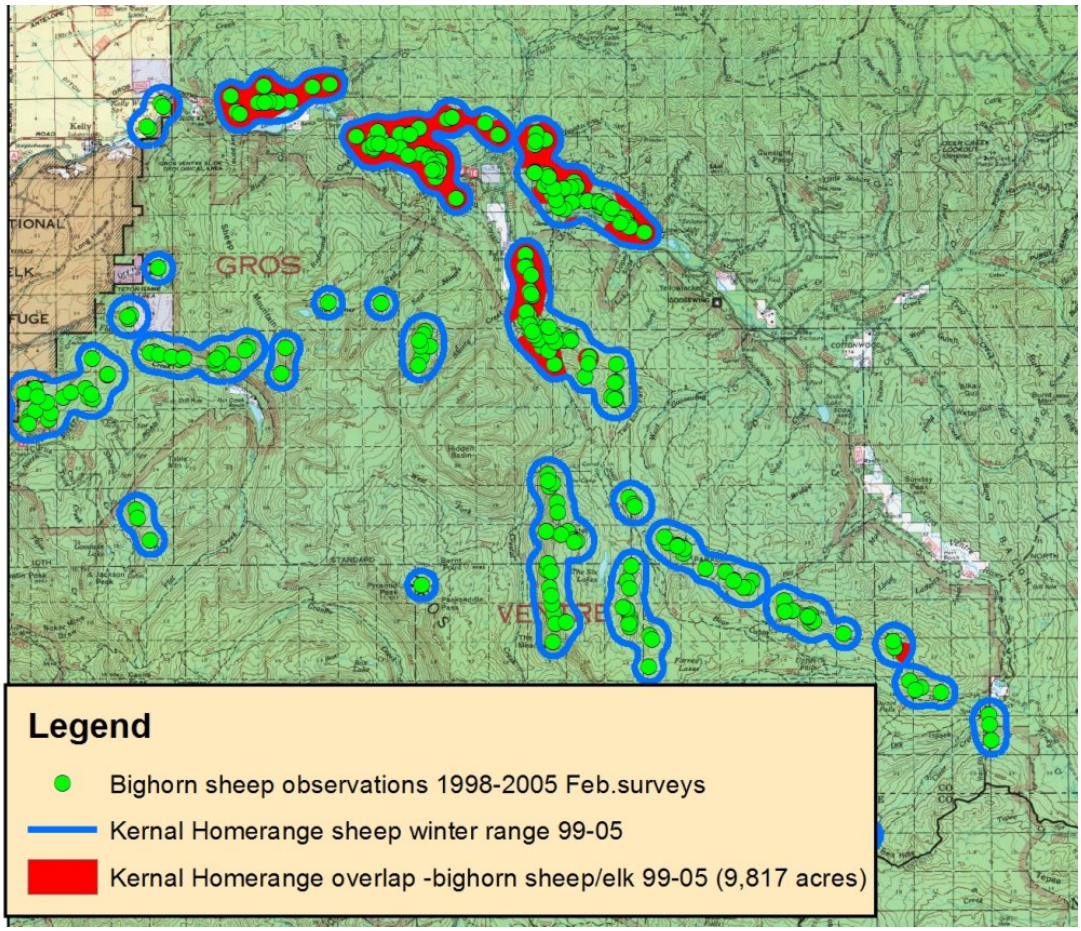

Figure 8. Bighorn sheep locations observed during aerial classification flights Feb. 1998-2005, a 95% Kernal Home Range Estimator, and the range overlap identified by the Kernal estimator for both elk and sheep.

Elk Migrations. Some elk routinely migrate out of the Gros Ventre River drainage to lower elevations in the Kelly area and onto the NER. There is even some data suggesting movement to South Park. Movement to the Spring Gulch area has not been documented with tag data but is suspected. Elk also migrate from the NER into the lower Gros Ventre, Kelly, and Spring Gulch areas. The number of elk involved in these movements is undetermined for most years, and except for commingling/damage, has not affected elk management. Some movement of elk from the Gros Ventre occurs despite efforts to retain elk at the 3 feedgrounds. Despite the apparent availability of adequate forage to winter in excess of 3,000 elk most years, based on known movement patterns it is speculated, that more elk will move down drainage toward the NER and the Spring Gulch area if feeding is phased out in the Gros Ventre. The NER would like to reduce elk numbers and amount of feeding (Reiswig personal communication, 2005). Wintering more elk on the NER from the Gros Ventre is not be desirable.

Wolves. Wolves affect the herd size and location of elk wintering on or near the Gros Ventre valley floor. Wolves chase large numbers of elk from and between feedgrounds. The effect that wolves might have on elk distribution, if feeding is terminated, is not known. The overnight movement of about 1,200 elk from the mouth of Crystal Creek in December 2004 (prior to feeding) to the Goosewing area was thought to be the result of wolf activity.

On some occasions when snow levels begin to recede, elk displaced from feedgrounds by wolves remain on native ranges and do not return to feed lines These movements are beneficial near the Fish Creek and Patrol Cabin feedgrounds. Elk displaced from the Alkali feedground by wolves cause concern for

damage/commingling at the Red Rock and Red Hills ranches in 2004 and appear to have displaced 300 elk from the Alkali feedground to the Glen Taylor Ranch in 2006.

Analysis of Data/Information

The NGO Phase-out Proposal identifies the presence of brucellosis, potential for spread of other diseases, and the cost of feeding as justification for the elimination of feeding in the Gros Ventre in most winters, with emergency feeding in severe winters (Dorsey 2005, Roffe 2005). The proposal is based on an estimated amount of forage produced in the Gros Ventre and the number of elk that fed on native ranges in the Gros Ventre prior to the late 1940's.

NGO Carrying Capacity Estimate. Adequate forage production and availability is one of the justifications for the NGO Phase-out Proposal. The NGO's forage production/availability calculations suggest adequate forage is available to support over 4,000 free ranging elk in the Gros Ventre.

Determining Carrying Capacity. Carrying capacity estimates are always problematic due to the annual variations in forage production and availability. Observations from 1938 shed some light on determining the size of winter ranges and carrying capacities. Anonymous (1938a) stated, "Only a small portion of the Gros Ventre winter range is available because of deep snow on the north slopes and sagebrush flats. This leaves only the wind blown ridges and willows above the snow line. The availability of browse is the determining factor for elk survival. Over browsing of willows in past years is evident and partially responsible for losses this year".

Based on analysis approach, three different sizes of winter range were used to evaluate carrying capacity. The existing WGFD winter range designation was used for one-analysis. It is accepted that not all of the designated winter range is available during the winter months due to the course scale in which it was delineated. The actual locations of elk during winter months provide the best information on the size of areas utilized. However, these locations change as the severity of the winter changes. Since most winter elk observations have been made by the WGFD during February classification flights, a time period when winter range is typically most limited, February elk observations were used to delineate winter range acreage for the other two analyzes. Winter range use areas could be larger during months preceding and following February depending on snow conditions. A SWE model for the Gros Ventre winter range was used to assess what percentage of forage produced is available for elk consumption. The effect of crusting on forage availability could not be evaluated due to the lack of any assessment tool, but crusting is known to influence forage availability and elk movements.

The three analyzes used in this report indicate forage production and availability, excluding effects of snow crusting, is sufficient to support existing winter elk numbers in the Gros Ventre except in dry years. However, the most conservative estimate suggests even in an average precipitation year forage would be limiting for more than 3,000 elk, considering forage needs for other ungulates.

Winter Travel and Winter Range Use Compared to Historical Elk Numbers. Historical data (Anderson 1958) indicated that between 2,273 to 9,128 elk wintered on native ranges in the Gros Ventre prior to regular elk feeding. Locations of these elk were generally not recorded. One report however, identified specific elk locations in 1938 (Anonymous, 1938b). A total of 3,726 elk were counted in this survey and the majority of these elk were in bottoms and lower slopes in the vicinity of Fish Creek and Goosewing Creek and the lower slopes in the Alkali/Crystal Creek area. Anderson (1958) reported similar observations in the 1950s. Recent early winter observations also reveal large numbers (up to 1,500 –2,000 elk) on the valley floor from the private land in the upper portion of the drainage down to the Miner Creek area near Red Rock Ranch. Prior to 1960, these areas received minimal, if any, human activity during the winter months. Today, these areas are the centers of human activity in the Gros Ventre particularly in January when commercial snowmobile tours begin traveling along the river. Groomed snowmachine trails run through the center of Alkali/Crystal Creek. The Goosewing area currently has 2 groomed snowmachine trails. The once vacant private property now has several homes with 3 yearlong residents, a commercial winter resort, and about 40 acres set aside as a recreation area for snowmachiners. The Fish Creek area also has 2 groomed snowmachine trails in the valley bottoms.

In an effort to mitigate increased human activities in the Gros Ventre, the Bridger Teton National Forest implemented a winter travel plan that restricts winter travel to established routes in the late 1980s. It is likely that human activities will continue to increase and influence winter range availability adjacent to the snowmobile routes in the Gros Ventre. During the early winter period it is likely that large numbers of elk will drift to the valley floor undisturbed. In January, temporal displacement will likely occur as commercial snow machine tours travel on routes through and adjacent to riparian communities. Elk may abandon high traffic areas near Goosewing and Fish Creek. It is unknown if the level of human disturbance will increase during the day and nighttime to the point of reducing winter range availability along the Gros Ventre River.

Current Feedground Management. Currently, the decision to initiate feeding each winter is based mostly on the location and movement patterns of the elk, with an emphasis on preventing stored and standing crop damage and commingling of elk and livestock. The NGO Phase-out Proposal, would initiate feeding based solely on forage production and a calculated carrying capacity. The proposal makes the assumptions that elk, which gather in the valley floor early in the winter, will redistribute across the available winter range to obtain sufficient forage, and/or situations caused by increased down drainage drift of elk can be mitigated. The WGFD currently tries to minimize the length of the feeding season. The length of the feeding season in the Gros Ventre is generally 30 days shorter than any other herd unit in the Jackson/Pinedale Region. Average feeding period is 90 days. The WGFD delays feeding in the Gros Ventre each year until such time that additional delays would result in unnecessary risk management (damage, commingling, etc.).

Wolves. Each winter since the arrival of wolves in the Gros Ventre, elk have been chased from feedground to feedground, up and down the Gros Ventre River bottom. Despite these movements most of the elk have remained on or in the vicinity of feedgrounds. On some cases, they have been chased onto the Red Rock Ranch and into the hills near the Red Hills Ranch. During the winter of 2005-2006, with deep snow conditions, wolves chased about 300 elk from the Alkali Feedground to the Glenn Taylor Ranch causing a commingling problem. It is possible that the activities of wolves could move elk to private property below Alkali or to the NER if feedgrounds were not in operation and serving as an attractant. Wolves have been responsible for displacing elk several miles from feedgrounds in other parts of the Jackson/Pinedale Region. Once elk have wintered successfully at a particular location, it can be difficult to alter their propensity to move back to that location. In the future if movements to lower elevations (private properties below Alkali and the NER) occur, and food is obtained, the same movements can be expected to re-occur in following years.

Periodic Feeding. One provision of the NGO Phase-out Proposal is to feed elk only during years of heavy snowfall or poor forage production. . This strategy poses a new set of challenges. First, the severity of a winter is hard to determine until late in the winter period. Elk movements will probably begin before the severity of the winter can be determined. Intensive monitoring would be required to ensure feeding is started before body condition deteriorates beyond the recovery point or before emigration occurs. Both will be difficult to measure or predict. If a large number of elk start to migrate out of the Gros Ventre before feeding is initiated this movement will likely continue even if feeding is started. This lesson has been learned on other feedgrounds (North Piney, McNeel). Once a movement out of the Gros Ventre occurs, similar movements may occur in subsequent years unless feeding is started very early in the season. Finally this strategy, though less expensive than the current feeding program, would still be costly because large amounts of hay would still have to be stored, and if not used for several years a percentage of the hay is lost due to spoilage and would have to be replaced. It also becomes more difficult to feed older hay (baling twine is destroyed because of ultra violet light and rodents).

Competition with Big Game Species. Encouraging an additional 2,000-3,000 elk to utilize winter ranges in the Gros Ventre could increase competition with the existing 1,000-1,500 free ranging elk, 150 moose, and 130 bighorn sheep. Most moose observations are in or near the valley floors. This is also where elk congregate as winter progresses and snow conditions worsen. Heavy use of willow and bitterbrush in the valley floor by elk would reduce forage for wintering moose. Increased use by elk of overlapping bighorn sheep winter ranges could significantly decrease available forage for wintering bighorn sheep. The Kernal

Home Range Indicator estimates there are 9,817 acres in the Gros Ventre where elk and bighorn sheep winter ranges overlap. There are 23,549 acres of winter range overlap between elk and moose.

Migration to NER. Migration of elk to the NER currently occurs in spite of efforts to limit this movement via feeding. It seems likely that significant numbers of elk would migrate down drainage in the absence of feeding. The NER Manager (Reiswig, personal communication, 2005) stated that additional elk from the Gros Ventre would hinder efforts to reduce or eliminate feeding on the NER. Experience in other areas (North Piney, Upper Hoback) has shown that once elk move to a new area, they have a tendency to return in subsequent years. It is possible that more Gros Ventre elk will annually return to the NER if they receive feed.

Starvation. The Gros Ventre native winter range currently supports an average of 1,400 elk. A phase-out would place an additional 2,500 elk on the riparian corridor and lower foothills similar to what was observed in the 1930s and 1950s. During this time starvation occurred and population fluctuations and winter migrations of elk down drainage were routinely observed. From historical accounts most significant starvation events were documented when elk numbers apparently exceeded 5,000 wintering animals, but in one account, significant starvation occurred in 1937 and 1938 with wintering elk numbers of 3,726. Based on carrying capacity estimates and historic accounts it seems that most starvation events could be avoided without supplemental feeding if elk numbers wintering in the Gros Ventre were closer to 3,000 than the current 4,500. Although significant starvation events may be avoided with a winter population of 3,000 elk, natural mortality rates will increase without supplemental feeding, further reducing hunter opportunity.

Supervision of the Feeding Operation. Using a committee (sportsmen, NGOs, and WGFD) to decide when to feed or not feed, as suggested by Roffe (2005) will not improve this type of decision-making process. The WGFD tried an internal committee approach in the 1990s with little success. Critical management decisions from a committee comprised of such diverse interests and agendas does not allow for the timely decision making necessary. The authority and responsibility for such decisions must be entrusted to one entity. By statute, authority for wildlife management decisions in Wyoming has been entrusted to the WGFC, who respond to a diverse constituency and delegates day-to-day management decision-making authority to the WGFD. Additionally, the proposal that temporary personnel monitor elk distribution and behavior, with regards to ambient conditions, can be problematic. Experience from many years of observation provides perspective and ability to make judgments necessary for these type of management decisions, experience most temporary or voluntary personnel will not possess.

Brucellosis and Commingling. Down-drainage elk movements from the Gros Ventre would increase the risk of disease transmission to cattle herds. Five cow/calf livestock operations exist in the lower Gros Ventre. These operators were asked about options that could reduce risk of brucellosis transmission (selling cattle, converting to steer/spayed/yearling operation, wintering cattle elsewhere, and/or fencing feeding/calving areas). Four of the five operators were not willing to alter their current operations at this time. One operator would be willing to have his cattle feeding area fenced (approximately 600 acres where about 600 cow/calf pairs are fed) if completed and paid for by others..

It is desirable to make every reasonable effort to reduce the incidence of brucellosis in elk. The incidence of the disease should decrease if the majority of the elk currently fed in the Gros Ventre dispersed into smaller herds and use native ranges. This may occur if wintering elk numbers were well within carrying capacity and feeding was eliminated, but this action would involve considerable risk that more elk would seek down drainage areas to winter. With the prevention of elk/bison and livestock commingling as the current top priority for managing brucellosis, all five cow/calf livestock operations would have to be modified or feeding/calving areas fenced before a trial phase out of feeding could be attempted.

Other Diseases Concentrating elk on feedgrounds enhances the opportunity for the spread of disease. The effects of other diseases that may be transmitted to elk in the Jackson area in the future is still speculative in terms elk productivity and survival in a feedground situation. CWD research has been initiated by the Wyoming Game and Fish Department at the Tom Thorne/Beth Williams Wildlife Research Unit at Sybille to assess the possible effects of CWD. All actions to reduce the concentration of elk during the winter will reduce the opportunity for disease transmission. If practical, eliminating feeding would

reduce risk of interspecific disease transmission. With feeding, several standard practices help to reduce transmission risk, limiting the total time elk are concentrated on feedlines by delaying the start of feeding and stopping as early as possible in the spring, spreading feed over as large an area as possible and moving feeding areas frequently to minimize elk concentrations in one area.

Damage. If feeding elk in the Gros Ventre is terminated, damage and commingling will likely increase significantly. Private property exists in the 3 areas that traditionally (prior to and after the establishment of feedgrounds) attract most of the elk that winter in the Gros Ventre drainage, i.e., the lower Fish Creek area, Goosewing area, and lower Crystal Creek/Alkali area. Elk utilization will increase on standing crops in the Fish Creek, Crystal Creek, and Lower Slide Lake areas. Commingling will occur at the Red Hills (horses) and Taylor Ranch (cattle and horses). In addition, elk migrating from the Gros Ventre may cause damage/co-mingle at various locations in the Kelly and Spring Gulch areas. Based on landowner contacts, the potential to initiate mitigation measures, including fencing feeding/calving areas, purchasing winter forage easements and providing livestock owner compensation for wintering livestock in areas where commingling risks occur, is low.

Program Cost Savings. Phasing out feeding would save dollars for the WGFD. Some associated management costs (elk monitoring, damage claims, etc.) would increase but the WGFD would still realize some savings. Cost of hay and feeder salaries in the Gros Ventre have averaged $106,000 for the past 5 winters (ranged between $74,000 and $143,000). Roffe's (2005) projected savings of $150,000 per year is excessive. If elk were still fed occasionally (years of heavy snowfall), savings would be reduced substantially, since hay would still have to be stored and large amounts replaced periodically due to spoilage during years of no use.

Summary

The NGO Phase-out Proposal will only be successful if the 2,500 elk, currently being provided supplemental feed on the three feedgrounds in the Gros Ventre valley, can be sustained and remain on native ranges above Crystal Creek in addition to the existing 1,000 to 1,500 free ranging elk. This will not occur in years when growing season precipitation is below average based on the best estimates of carrying capacity available for the Gros Ventre. Inadequate forage for this number of elk may even be the case in mean precipitation years. However, based on the three carrying capacity estimates calculated in this assessment for mean and above average precipitation years, to some degree historic accounts of elk numbers and starvation events, and the need to prevent added competition for forage with bighorn sheep and moose wintering in the Gros Ventre valley, it appears there may be adequate forage available most winters for an elk herd closer to 3,000 than the current 4,000-4,500. However, the primary unknown this evaluation, or any evaluation cannot answer, is how much down drainage movement of elk and elk/livestock commingling will occur without supplemental feeding on the Gros Ventre winter range. This is a very significant factor with the current prevalence of brucellosis in the Gros Ventre elk herd, the high potential for commingling down drainage, and the prevention of commingling a top priority of Governor Freudenthal's Wyoming Brucellosis Coordination Team.

Any additional down drainage movement of elk will increase damage to stored and standing crops and commingling risks with livestock. Historic accounts and recent elk movement data document interchange of Gros Ventre elk with other areas but the most significant interchange has been with the NER and lower Gros Ventre. An increase in these types of movements can only be accommodated if the risk of damage and commingling with the five livestock operations in the lower Gros Ventre are adequately mitigated. This can only happen if landowners are willing to voluntarily fence their winter-feeding and calving operations or make a change in their class of operation. Due to the significance of these changes there would have to be a substantial source of funding available for implementation. In addition, there must be support from the NER to accommodate more elk from the Gros Ventre if some or most of the elk decide to move to the NER. The current Draft of the Jackson Elk/Bison EIS promotes a preferred management alternative of maintaining 2,500 to 3,000 less elk on the NER (elk objective of 4,000 to 5,000 vs. 7,500) than in past years, and at least 2,000 elk less than wintered on the NER in 2005-2006.

In conclusion, based on all the data reviewed, it appears the only way a trial phase out of feeding could be attempted is if the current population of elk wintering in the Gros Ventre is reduced by 1,000 -1,500 animals, mitigation measures to prevent livestock and elk commingling are implemented by landowners in areas of highest potential for damage and commingling, and the NER agrees to accommodate any additional elk that could move from the Gros Ventre winter range to the NER. The WGFC/WGFD has authority to unilaterally address only one of these factors, elk numbers wintering in the Gros Ventre. Any change in elk number objectives will require a public input process to discuss the issue and determine the level of support. Based on this final assessment, WGFD does not support a phase-out trial and firmly believes continuation of feeding is necessary to maintain elk management objectives and current elk hunting opportunities in the Jackson elk herd.

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Appendices

Appendix 1. Vegetative types and average annual production (pounds/acre) of vegetation produced in average, wet, and dry years in the Greater Teton Ecosystem, Wyoming (Hobbs et al., 2003). Values are a result of data collected by the National Elk Refuge, U.S. Geological Survey – Biological Division, Bridger Teton National Forest and Wyoming Game and Fish Department.

Vegetation type	Mean Production(lb/ac)	Wet Year Production (lb/ac)	Dry Year Production(lb/ac)
Agricultural	2,498	3,747	1,124
Alpine Herbaceous/Shrub	1,693	2,540	762
Aspen	1,712	2,568	770
Douglas Fir	705	1,058	317
Dry Montane Meadow/Grass	895	1,343	403
Montane Shrub	1,708	2,562	769
Riparian Forest	2,524	3,786	1,136
Sagebrush	1,190	1,785	536
Shrub Riparian/Willow	2,125	3,188	956
Spruce/Fir	1,162	1,743	523
Subalpine Pine	1,167	1,751	525
Water/Rock/Snow	0	0	0
Wet Meadow	2,385	3,578	1,073
Wetland/Sedge/Marsh	4,760	7,140	2,142

Note: Hobbs et al. (2003) addressed the question of spatial heterogeneity for production due to potential varying rainfall over the study area. Spatial differences in production (i.e. sagebrush production on NER vs. Gros Ventre) were not statistically different. Ten (10) of the 48 Hobbes et al (3003), production sites in the Greater Teton Ecosystem were located within the Gros Ventre. They also utilized additional production values from the data collected by the US Forest Service and Wyoming Game & Fish Department.

Appendix 2. A weighted Kernal Home Range Estimator (Beyer 2005) was utilized to determine winter range acreage based on the locations of observed elk groups nine or larger during February elk classification flights in the Gros Ventre drainage from 1999 – 2005 (Figure 2a). In this analysis, approximately 50,193 acres were identified. There were 118 groups of elk with less than nine individuals not used to delineate winter range, representing only 301 elk (123 mature bulls, 49 spike bulls, 89 cows, 33 calves and 7 unclassified elk) out of 689 total groups representing 8,150 elk. Single animals made up the majority of the groups left out of the analysis. The acreage from this analysis represents the majority of elk distributed on winter range at a time of the winter when forage is most limited.

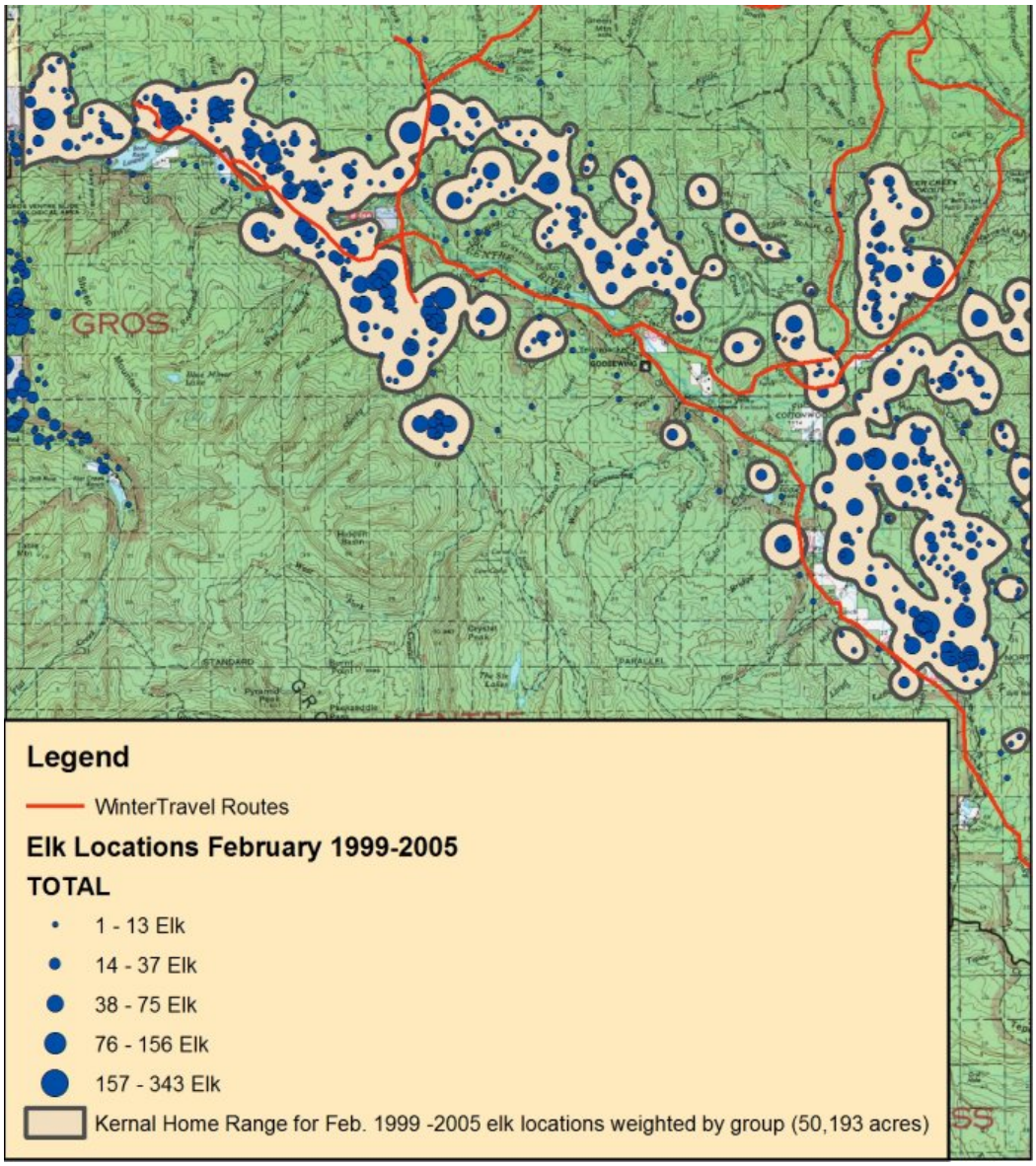

Figure 2a. Elk groups observed during aerial classification flights Feb. 1999-2005 along with a 95% Kernal Home Range Estimator weighted by group size. Elk on the Alkali, Patrol Cabin and Fish Creek Feedgrounds were not included in this analysis and small groups of elk (less than 9 elk) fell out of the analysis due to the weighting.

Appendix 3. An un-weighted Kernal Home Range Estimator was also utilized for all elk observed in February 1975 – 2005 in an effort to treat all elk groups independently. This analysis treats single elk locations the same as larger group locations. This approach provided a winter range acreage estimate of 108,006 acres (Figure 3a). This acreage probably represents the distribution of elk during winter periods of less snowfall.

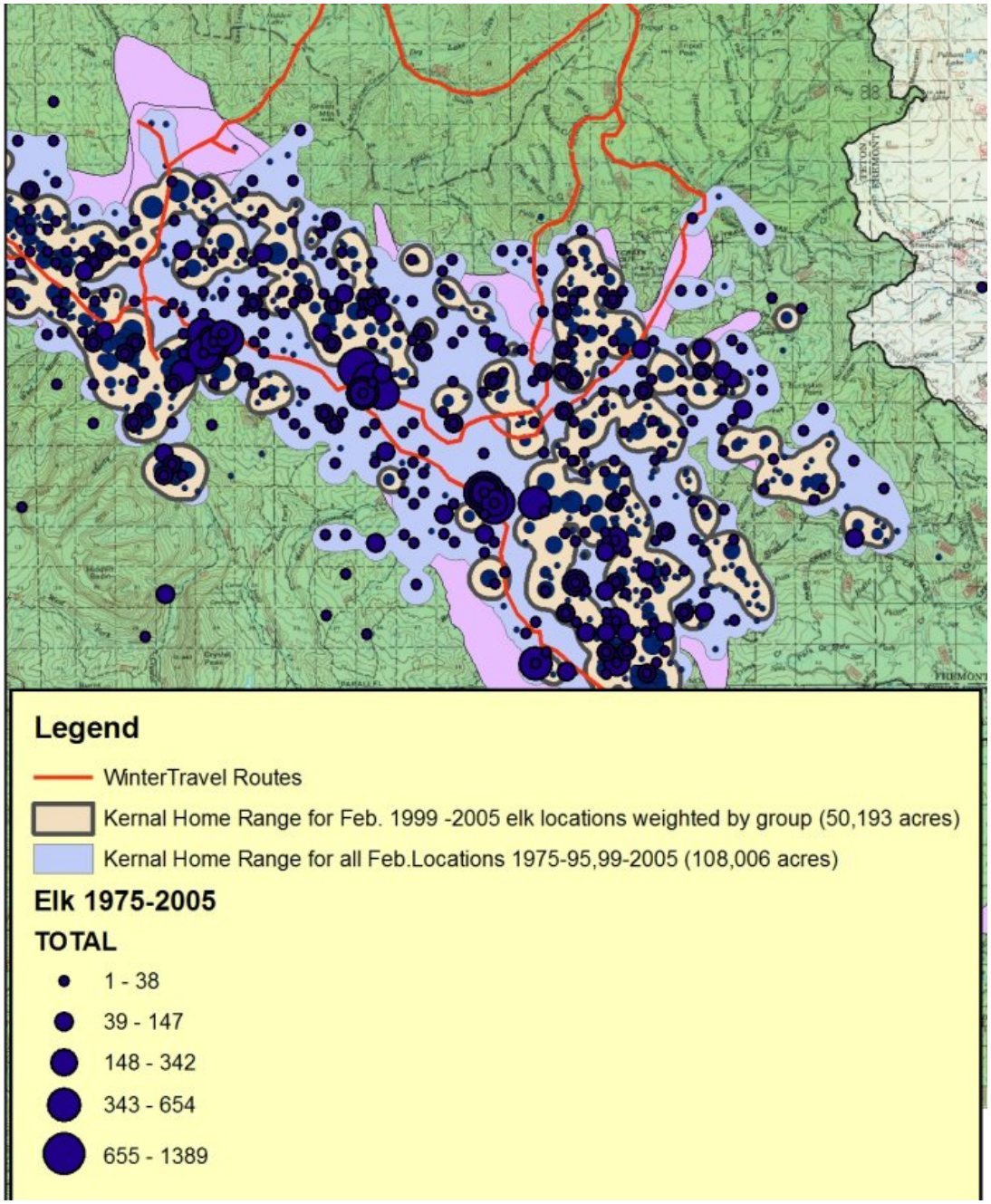

Figure 3a. Kernal home range estimator for un-weighted elk locations collected during classification flights 1975 – 2005 in blue compared to the Kernal estimator weighted by group size for elk locations collected between 1999-2005 and existing winter range designated in the Gros Ventre Drainage.

Appendix 4. Carry capacity estimate by Dorsey (2005) in "A conservative approach to estimating forage production, availability, and elk consumption during winter on the Gros Ventre Valley Winter Range". The following parameters, assumptions and calculations for his conservative production and consumption estimates:

1. Utilized vegetation types similar to Hobbs et al. (2003).
   - Utilized the "drought" production figures (45% and 30% of a mean and wet production year, respectively).
2. Total Winter range designated by WGFD = 103,704 acres
3. Considered 2/3 of the winter range unavailability due to snow pack. This is more than the 45.4% deduction by Bailey (1999).
4. Removed all acres of nonproductive areas (i.e. barren rock, mud flats etc.)
   - 35,454 acres of winter range remaining
5. Considered 35% of the total production on the 35,454 acres unavailable due to unpalatability and inaccessibility (same as Hobbs et al. 2003).
6. Total forage production on the 35,454 acres minus 35% = Available forage on a dry yr - 17,816,408 lbs X 35% = 11,580,665 lbs. of available forage on dry yr.
7. Used Hobbs et al. (2003), consumption rate of dry matter = 2% of body mass/day
8. Used age/sex ratios from classification counts on Gros Ventre – Brimeyer (2005)
9. Consumption rates: calves - 4 lbs/day, cows/spks/yrl - 10 lbs/day, bulls - 13.5 lbs/day
10. No. elk in Gros Ventre X consumption rate per elk X 183 days = Total elk consumption
    - 4,419 (2005 count) X 8.7198 lbs X 183 days = 7,051,502 lbs consumed
11. This would equate to 60% utilization, leaving forage available for other wild ungulates and watershed protection.
12. If less conservative calculations are made, (i.e. winter is less severe or summer precipitation is normal to wet), forage availability and production is considerably increased.

Given the assumptions and parameters and existing production information used this is considered a conservative estimate of forage availability.

Appendix 5. Three approaches for estimating winter carrying capacity for elk in the Gros Ventre.

1. Current winter range delineation with SWE decrements – Data from the February 1, 1996 SWE distribution map (Hobbs et al. 2003), and the existing WGFD delineation of winter range were used to make an estimate of forage availability (Figure 5a). - Winter severity in 1996 was considered to be average by Hobbs et al. (2003). One should consider this to be a conservative estimate since it considers forage availability at one point in time February 1. There would be more forage available earlier and later in the winter depending on snow conditions during the early and late parts of the winter season. Current winter seasonal delineation

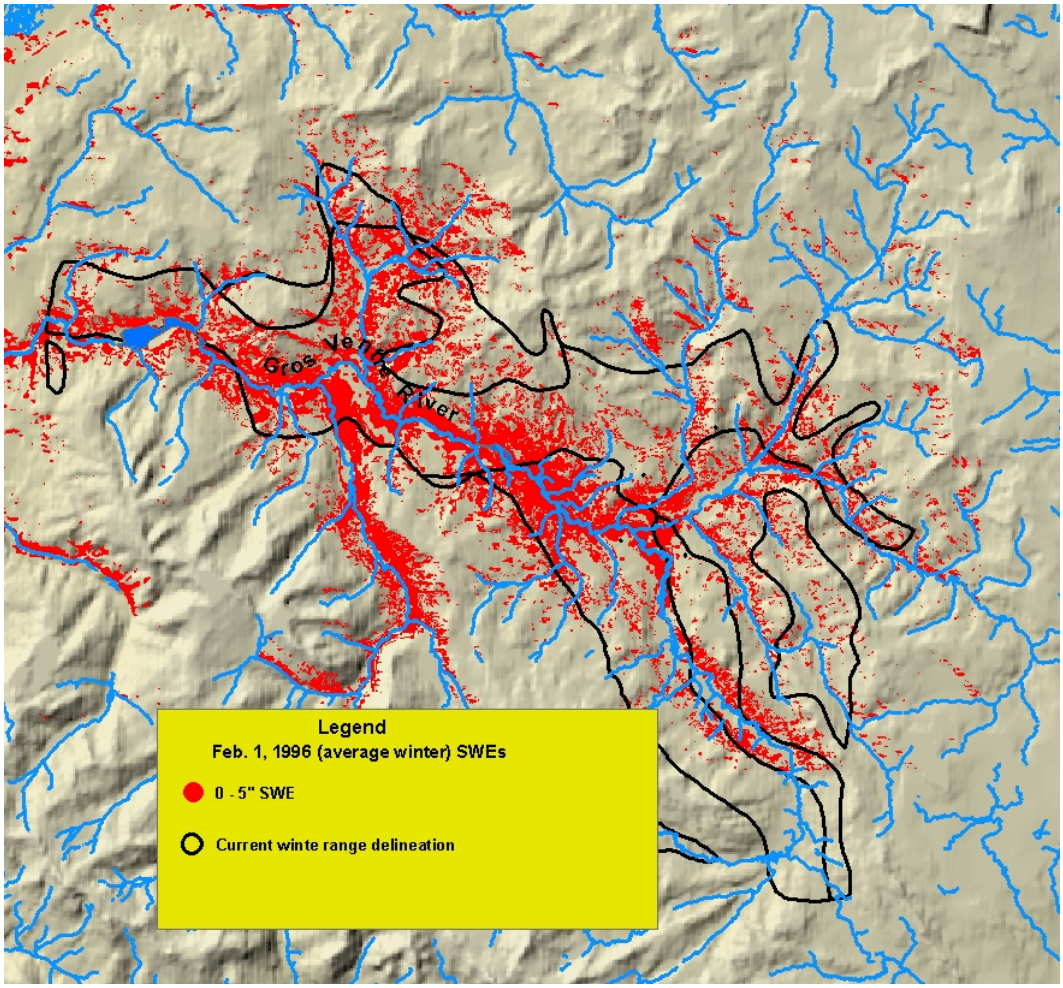

Figure 5a. Current winter range delineation and February 1, 1996 (average winter severity) 0-5" SWE. Total acres = 92,743 acres, and acres with 0-5" SWE = 28,201.

(including WIN, CRU, WYL) for the Jackson Elk Herd Unit was developed and hand-drawn in the 1980's (Figure 1a). This is very similar to the winter range delineation used by Dorsey (2005), to estimate production/consumption. We estimated forage production on 92,743 acres versus the 100,427 acres used by Dorsey (2005). The difference is mostly due to not using winter range acreage to the west of the Bridger-Teton National Forest/Grand Teton National Park boundary line (Figure 5b). We utilized the vegetation type classification and production values provided by Hobbs et al. (2003). However, 8,179 acres of designated winter range did not fall within the vegetation classification grid provided by Hobbs et al. (2003). Thus, production was estimated on only 84,564 acres of the available 92,743 acres. Refer to Table 5a for forage availability within given SWEs.

The estimated pounds of available forage minus the February 1, 1996 SWE deductions are depicted in Table 1a. Values for mean, wet, and dry production scenarios are 10,247,995, 15,373,043, and 4,613,236 pounds respectively.

Utilizing Hobbs et al. (2003) elk consumption rates, 2005 elk classification data (i.e. sex and age ratios), the amount of forage available on February 1 of an average winter within current winter range (84,564 acres), and a 35% overall reduction due to unpalatable and inaccessible forage, the mean, wet and dry carrying capacities for 183 days would be 6,422, 9,634 and 2,891 elk respectively. These figures would be a little higher if the 8,179 acres not covered by SWE and vegetation grids were included in the analysis. Predicted forage utilization rates would be variable and dependent on SWE or availability at specific sites. For example, utilization would be 100%, 75%, 50% and 25% in areas with 0- 2", 3", 4", and 5" of SWE, respectively (See Figure 5b for relative amounts of the winter range within each SWE).

Table 5a Forage availability within current winter range delineation (84,564 ac) and adjusted from SWEs on February 1, 1996 (average winter severity) following mean, wet and dry year production. Acres within 0-5" SWE = 28,201 acres.

Vegetation Type	Available forage after SWE deductions (lbs)		
	Mean Yr	Wet Yr	Dry Yr
Agricultural	491,308	736,962	221,069
Alpine Herbaceous/Shrub	9,466	14,202	4,261
Aspen	249,611	374,416	112,267
Douglas Fir	319,275	479,139	143,560
Dry Montane Meadow/Grass	380,871	571,520	171,498
Montane Shrub	329,995	494,992	148,575
Riparian Forest	200,430	300,646	90,210
Sagebrush	6,363,601	9,545,401	2,866,294
Shrub Riparian/Willow	1,557,306	2,336,326	700,605
Spruce/Fir	3,066,461	4,599,691	1,380,171
Subalpine Pine	1,860,142	2,791,009	836,825
Water/Rock/Snow	0	0	0
Wet Meadow	46,861	70,301	21,082
Wetland/Sedge/Marsh	890,820	1,336,230	400,869
TOTAL PRODUCTION	15,766,147	23,650,835	7,097,286
35% Reduction - not palatable	10,247,995	15,373,043	4,613,236
Carrying Capacity (# elk for 183 days)	6,422	9,634	2,891

Note: Forage availability was not estimated on 8,179 acres of winter range due to a lack of vegetation and SWE coverage.

2. Kernal home range estimator (95%) of winter range delineation with SWE decrements for all Feb 1975- 2005 elk observations - A second forage production/consumption estimate was made using the February 1, 1996 SWE distribution map from Hobbs et al. (2003), and a kernel home range estimator (95%) of all February elk observations 1975-2005, to delineate winter range. The existing winter range delineation was constructed by hand in the 1980's. Since that time several hundred additional observations coupled with advanced technology suggests a review of the existing winter range delineation is appropriate.

A kernel home range estimator was employed to assist with an objective delineation of the Jackson Elk Herd Unit winter range. The kernal home range estimator can be utilized at least two different ways to assist with winter range delineation. One option is to use only the 1999-2005 February observations and have them weighted for the number of animals at each location. Also, all of the 1999-2005 observations

are quite accurate as a result of being marked with a GPS unit during helicopter flights. This option delineated 50,193 acres of winter range within the Gros Ventre drainage and is illustrated in the next scenario.

The second option was to utilize all available February observations from 1975 –2005. Three concerns with this option were: 1) the 1975-1995 observations were made by plotting locations by half or quarter section (less accurate than the 1999-2005 GPS locations, 2) the analysis could not be done on a weighted bases due to the way the data was recorded, 3) at least some of the observations made from 1975-1995 were probably "lumped" by half or quarter section. Thus there was concern an over estimate of winter range might result.

Conversely, there are benefits to utilizing all February observations from 1975-2005 in the un-weighted format. All observations are a-snapshot-in-time and do not indicate general use of a given area. Including another 20 years of snapshots to the 6 years of recent but more accurate data would certainly smooth out overall distribution as well as enhance sample size. Moreover, by WGFD definition, winter range is the area used from December 1 through April 30. Given this time frame, one would expect winter range acreage to start out relatively large, shrink to its smallest acreage during mid-winter, and expand its acreage in late March and April. Thus, using only February observations is intuitively conservative, which may serve to compensate for the inaccuracy created through plotting the1975-1995 locations by quarter and half section. This option delineated 111,850 acres of winter range compared to 50,193 acres in the weighted group size option and 92,743 acres using the current winter range delineation.

The vegetation grid did not cover 3,843 of the 111,850 acres in this delineation. Thus, production values were not calculated on these acres. Utilizing Hobbs et al. (2003) elk consumption rates, 2005 elk classification data (i.e. sex and age ratios), the amount of forage available on February 1 of an average winter within current winter range, and a 35% overall reduction due to unpalatable and inaccessible forage, the mean, wet and dry carrying capacities for 183 days would be 7,641, 11,463 and 3,440 elk respectively (Table 5b). Predicted forage utilization rates are similar to the previous option.

Table 5b. Forage availability within kernal home range estimator (95%), delineated winter range using February 1975-2005 observations (108,006 acres) and adjusted from SWEs on February 1, 1996 (average winter severity) following mean, wet and dry year production.

Vegetation Type	Available forage after SWE deductions (lbs)		
	Mean Yr	Wet Yr	Dry Yr
Agricultural	701,012	1,051,518	315,427
Alpine Herbaceous/Shrub	10,515	15,775	4,733
Aspen	275,019	412,528	123,694
Douglas Fir	380,849	571,389	171,273
Dry Montane Meadow/Grass	465,837	699,016	209,757
Montane Shrub	366,393	549,590	164,963
Riparian Forest	235,466	353,199	105,978
Sagebrush	7,607,614	11,411,421	3,426,623
Shrub Riparian/Willow	1,662,261	2,493,783	747,822
Spruce/Fir	3,822,954	5,734,431	1,720,658
Subalpine Pine	2,232,631	3,349,903	1,004,397
Water/Rock/Snow	0	0	0
Wet Meadow	53,249	79,885	23,957
Wetland/Sedge/Marsh	945,099	1,417,648	425,295
TOTAL PRODUCTION	18,758,898	28,140,086	8,444,576
35% Reduction - not palatable	12,193,284	18,291,056	5,488,974
Carrying Capacity (# elk for 183 days)	7,641	11,463	3,440

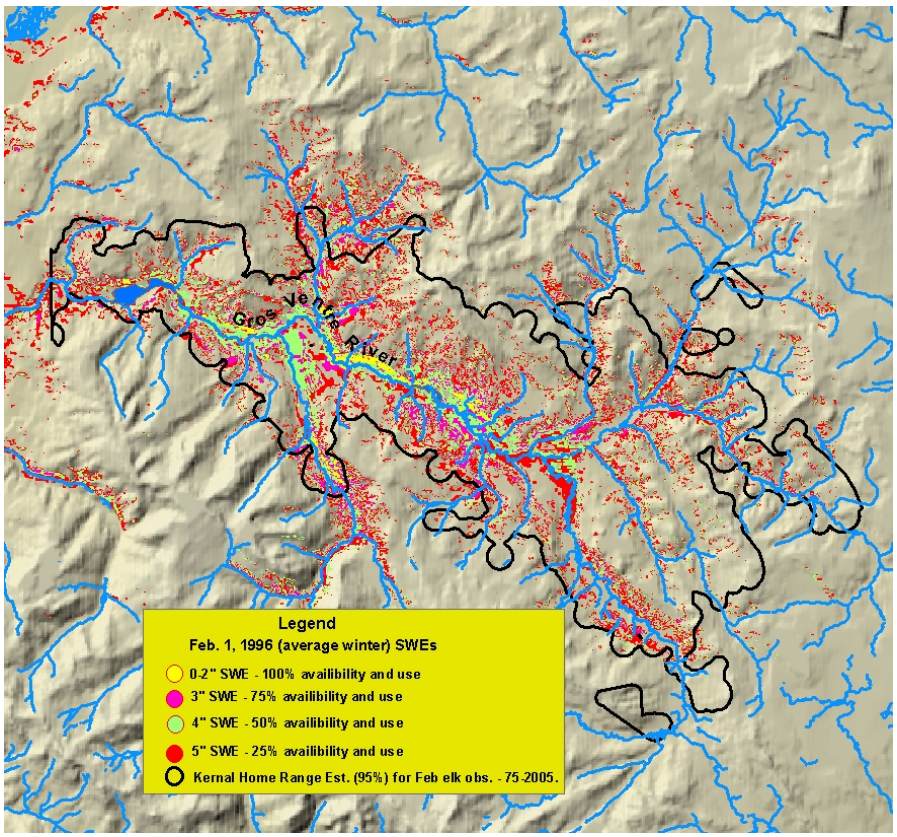

Figure 5b. Illustration of February 1, 1996 (average winter severity) SWEs and associated forage availability and utilization levels at maximum carrying capacity, GrosVentre drainage. Total acres = 111,850 acres, and acres with 0-5" SWE = 34,441 acres.

3. - Kernal home range estimator (95%) of winter range delineation with SWE decrements using only Feb 1999-2005 elk observations weighted by number of elk observed. - A third forage production/consumption estimate was made using the February 1, 1996 SWE distribution map from Hobbs et al. (2003), and a weighted kernal home range estimator (95%) of only the 1999-2005 February elk observations to delineate winter range. There are 50,193 acres within this delineation and calculations were not conducted on 267acres, which fell outside the vegetation grid.

The difference between this scenario and the previous one is that only observations of elk groups 9 or larger were used. Observations are all plotted using GPS units from helicopter flights.

Calculations for SWE decrements, forage consumption rates, and deductions due to unpalatable forage were the same as previous scenarios. Due to the smaller acreage (50,193 acres), this is obviously the most conservative estimate of forage availability. The mean, wet and dry carrying capacities for 183 days would be 3,375, 5,063 and 1,519 elk respectively (Table 5c). Predicted forage utilization rates are similar to the previous option.

Table 5c. Forage availability using winter range kernal home range estimator (95%) of 1999-2005 February observations of elk groups 9 or larger, (50,193 acres) adjusted by SWEs on February 1, 1996 (average winter severity) for mean, wet and dry year production.

Vegetation Type	Available forage after SWE deductions (lbs)		
	Mean Yr	Wet Yr	Dry Yr
Alpine Herbaceous/Shrub	9,388	14,084	4,225
Aspen	100,950	151,425	45,404
Douglas Fir	276,918	415,573	124,515
Dry Montane Meadow/Grass	234,131	351,327	105,424
Montane Shrub	149,191	223,786	67,171
Riparian Forest	71,103	106,654	32,002
Sagebrush	3,482,323	5,223,484	1,568,508
Shrub Riparian/Willow	313,822	470,807	141,183
Spruce/Fir	1,948,640	2,922,960	877,056
Subalpine Pine	973,282	1,460,340	437,852
Water/Rock/Snow	0	0	0
Wet Meadow	19,284	28,931	8,676
Wetland/Sedge/Marsh	247,253	370,880	111,264
Total Production	8,285,064	12,428,421	3,729,712
35% Reduction due to palatibility	5,385,292	8,078,474	2,424,313
Carrying Capacity (# elk for 183 days)	3,375	5,063	1,519

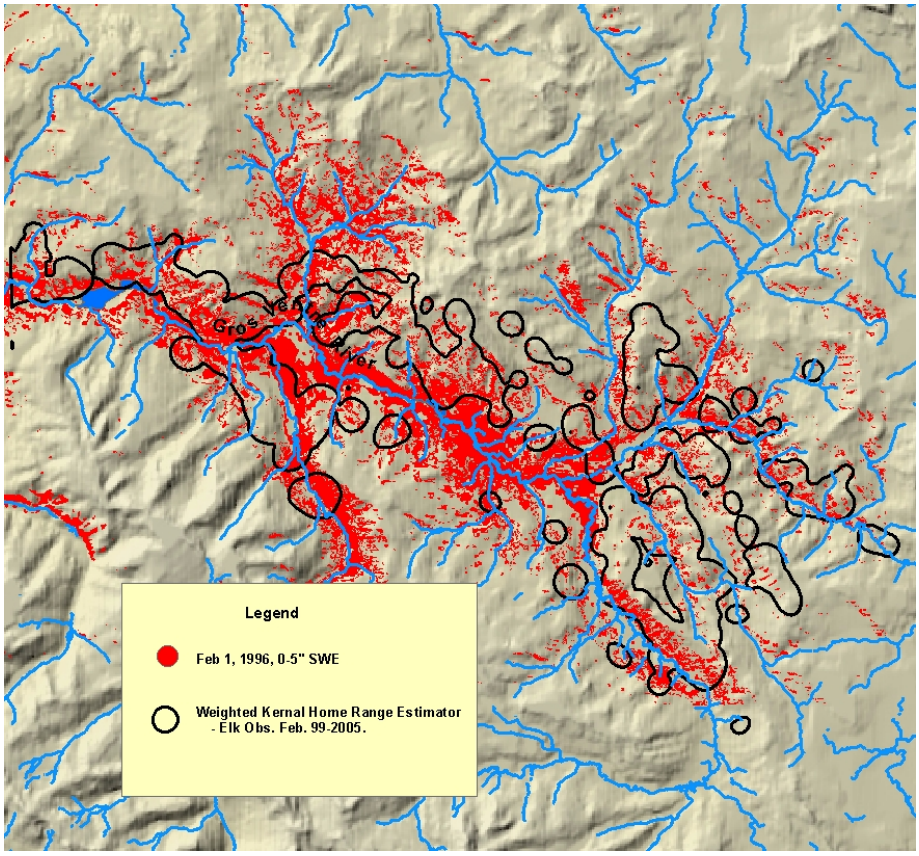

Figure 5c. Illustration of February 1, 1996 (average winter severity) 1-5" SWEs and the weighted kernal home range estimator of winter range (50,193 acres), for February observations 1999-2005, Gros Ventre Drainage. Acres with 0-5" SWE = 16,008.