CHAPTER 3. AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This Chapter summarizes the physical, biological, social, and economic environments of the Project Area and the Analysis Area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. The **Project Area** considered for this analysis includes the area proposed to be permitted for the feedgrounds. Environmental effects are also described within the **Analysis Area**, which is the area within 1 mile from the feedgrounds.

Consideration of Available Science

The techniques and methodologies used in this analysis consider the best available scientific methods and information. The analysis includes a summary of the credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts of the proposed action and alternatives. The analysis also identifies methods used and references the scientific sources relied upon. The conclusions are based on the scientific analysis that shows a thorough review of relevant scientific information. There was not any incomplete or unavailable information that would be necessary for the Forest Service decision regarding the use of NFS land for some of the State's winter elk management activities. The analyses relied upon disclose areas where there is currently incomplete scientific information, and indicate ongoing efforts to gather information.

The relevant science considered for this analysis consists of several key elements:

- On-site data and history.
- Scientific literature.
- Modeling using currently acceptable analysis.
- The collective knowledge of the project area by ID Team members through integration of science with local conditions.
- Comparative analysis considering other local similar projects and past monitoring data.

The determinations reached in this analysis are based upon ground reconnaissance of the proposed project area, previous monitoring of similar types of activities on NFS lands, and a review of the literature that is cited in the specialist report. The project area was surveyed and data was collected in 2007 using water quality/watershed monitoring information, riparian inventory, vegetation inventory and soil survey information. The use of Best Management Practices to ensure water quality is protected is addressed in this analysis. Relevant literature indicates that BMP's are effective in protecting water quality and long term soil productivity. Experience gained from implementation of livestock grazing plans and through observations of impacts of elk feedgrounds over the past decades has been incorporated into the analysis. The affects to resources in other similar projects in the area have been considered in the analysis.

Resource specialists determined that the potential effects of this project are predictable and well documented with no significant scientific uncertainties or risks associated with this proposal.

Soils

A. Issues to be Addressed

Issue #1. High concentrations of elk on the feedgrounds during certain soil conditions could cause soil compaction and/or increased erosion. Alternatives are compared in this analysis describing the current percent of detrimental soil disturbance at the feedgrounds and comparing the potential number of acres affected.

B. Existing Conditions

Soil compaction. This impact occurs in response to pressure (weight per unit area) exerted by machinery or animals. The risk for compaction is greatest when soils are wet. Compaction negatively affects vegetation by reducing the uptake of water and nutrients, reducing plant vigor. Compaction also decreases infiltration and thus increases runoff and the hazard of water erosion (USDA 1996). Grazing by large animals such as elk and cattle can cause compaction because their hooves have a relatively small area and therefore exert a high pressure. Platy soil structure[1] and high penetration resistance are the primary indicators of compaction. Soil scientists measured compaction on the feedgrounds by digging soil pits and observing soil structure, plant rooting, and penetration resistance, and collecting bulk density[2] samples.

Active erosion. *Erosion* is the detachment and transport of individual soil particles, or aggregates of particles, by wind, water, or gravity. Management practices may increase the hazard of soil erosion when ground cover is removed and soil particles are detached. Surface or particulate erosion occurs as the loss of soil by gravity (dry ravel), by wind, or by gravity and water, including raindrop splash and overland flow (rill and/or sheet erosion). Mass wasting occurs when large masses of soil and/or rock fall, slide, or flow down a slope. Indicators of erosion include pedestaling[3] of plants, presence of rills and gullies, exposed roots and lichen lines on rocks.

Detrimental Soil Disturbance. Soils are considered detrimentally disturbed when one or more of the above indicators is rated unsatisfactory. Regional handbook guidelines state that no more than 15 percent of an activity area should have detrimentally disturbed soil after the completion of all management activities (grazing cycle). In other words, at least 85 percent of an activity area (feedground) should be in a non-detrimentally disturbed condition (FSH 2509.18 – R4 Supplement 2003).

[1] In platy soil structure, the soil units are flat and plate-like. They are generally oriented horizontally. Platy structure is usually found in subsurface soils that have been subject to leaching or compaction by animals or machinery. Platy structure tends to impede the downward movement of water and plant roots through the soil.

[2] Soil weight is referred to as soil bulk density. Density is the mass of material contained within a given volume.

[3] Pedestaling is a condition where the soil has eroded from around individual plants, leaving them on small pedestals of soil.

Alkali Creek Feedground: At the Alkali Creek Feedground, sheds are located and direct feeding occurs on NFS land. The soil profile description was classified as a coarse-loamy, mixed, superactive, xeric haplocryalf. Soils at this and other feedgrounds are affected by compaction from elk, horse, and cross country use of the hay wagon. Detrimental soil disturbance in the activity area identified is 8 percent (80 percent confidence interval). Some level of compaction was identified in about one fourth of the area, but not all was severe enough to be considered detrimental. The main detrimental soil condition was compaction, identified by strong platy structure and verified by bulk density samples. This feedground is within the Upper Gros Ventre livestock grazing allotment.

View of feedground, corral, and shed **View north of feedground**

Corral **Thick organic surface horizon**

Figure 11. Alkali Creek Feedground

Dog Creek Feedground: At this site, sheds are located on-forest and direct feeding occurs both on- and off-forest. Effects to adjacent NFS land were assessed. The soil profile description was classified as a coarse-loamy over sandy skeletal, mixed, active, oxyaquic haplocryept. Detrimental soil disturbance in the activity area identified is 2 percent (80 percent confidence interval). Some level of compaction was identified in

about one tenth of the area, but not all was severe enough to be considered detrimental. The main detrimental soil condition was compaction, identified by strong platy structure and verified by bulk density samples. This feedground is not within a livestock grazing allotment.

Feedground **Wetlands at Dog Creek**

Figure 12. Dog Creek Feedground

Fall Creek Feedground: At Fall Creek Feedground, sheds are located off-forest and direct feeding occurs on NFS land and on adjacent properties. Effects of the presence of this feedground on NFS land, cumulative with all other uses, were assessed. The soil profile description was classified as a coarse-loamy, mixed, superactive, pachic argicryoll. Detrimental soil disturbance in the activity area identified is 8 percent (80 percent confidence interval). Some level of compaction was identified in about one fifth of the area, but not all was severe enough to be considered detrimental. The main detrimental soil condition was compaction, identified by strong platy structure and verified by bulk density samples. This feedground is within the Burnt Lake livestock grazing allotment.

Sparse groundcover near boundary fence **Soil profile.**

Figure 13. Fall Creek Feedground

Fish Creek Feedground: At the Fish Creek feedground, sheds are located and direct feeding occurs on NFS land. The soil profile description was classified as a fine-loamy, mixed, superactive, calcic argicryoll. Detrimental soil disturbance in the activity area identified is 8 percent (80 percent confidence interval). Some level of compaction was identified in about half of the area, but not all was severe enough to be considered detrimental. The main detrimental soil condition was compaction, identified by strong platy structure and verified by bulk density samples. This feedground is not within a livestock grazing allotment.

View from river across feedground to sheds **View from river up valley across feedground**

Thick organic surface layer **Soil profile.**

Figure 14. Fish Creek Feedground

Muddy Creek Feedground: At the Muddy Creek Feedground, sheds are located and direct feeding occurs on NFS land. Detrimental soil disturbance in the activity area identified is 2 percent (80 percent confidence interval). The main detrimental soil condition identified was compaction and the soil profile description was classified as a coarse-loamy, mixed, superactive, pachic haplocryoll. Cattle were present along the riparian area during the site visit, but bank disturbance was minimal (estimated to be less than 20 percent). This feedground is within the Muddy Canyon livestock grazing allotment.

View of sideslope and dry tributary behind sheds **Soil profile**

Figure 15. Muddy Creek Feedground

Patrol Cabin Feedground: At this site, facilities are located and direct feeding occurs on state land. Effects on adjacent NFS land were assessed. The soil profile description was classified as a coarse-loamy mixed, superactive, calcic argicryoll. Detrimental soil disturbance in the activity area identified is 7 percent (80 percent confidence interval). Some level of compaction was identified in about one third of the area, but not all was severe enough to be considered detrimental. The main detrimental soil condition was compaction, identified by strong platy structure and verified by bulk density samples. The proposed Coal Mine Draw addition to the feedground is within the Winter Range Forage Reserve grazing allotment. The Yellow Jacket Flat addition to the feedground is within the Upper Gros Ventre livestock grazing allotment. Soils on the Yellow Jacket Flat area are clayey with silty clay loam surface textures.

Non-system route on adjacent NFS lands View across Gros Ventre River

Figure 16. Patrol Cabin Feedground

Upper Green River Feedground: At the Upper Green River Feedground, sheds are located and direct feeding occurs on NFS land. Detrimental soil disturbance in the activity area identified is 4 percent (80 percent confidence interval). The main detrimental soil condition identified was compaction. The soil profile description was classified as a coarse-loamy, mixed, superactive, pachic argicryoll. This feedground is within the Green River livestock grazing allotment.

Feedground sheds Soil profile

Figure 17. Upper Green River Feedground

C. Effects of the Alternatives

1. Direct and Indirect Effects of Issuing No Special Use Authorization (Alternative 1)

With the removal of the feed and associated infrastructure, elk would no longer be attracted to these areas and the vehicular impacts of hauling the hay would cease. Soils within the Project Area would gradually recover over a period of 10 to 20 years. Compaction would dissipate over time and as the vegetation returned to its natural condition, the site would begin to stabilize, thus reducing erosion.

It is expected that winter elk management activities would continue to occur on state, private, and federal land adjacent to Dog Creek, Fall Creek, and Patrol Cabin Feedgrounds. Compaction would persist in the Analysis Area adjacent to these ongoing feedgrounds; however this amount is not significant. The amount of compaction in the Analysis Area was not measured because compaction measured within the feedgrounds was less than the Regional Handbook guidelines of 15%.

2. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area

- Table 5 summarizes the results of soil disturbance transects established for each feedground.

Table 5. Percent of each disturbance class and percent detrimental disturbance at each feedground.

Feedground	Class 0	Class I	Class II	Class III	% Detrimental Disturbance	n @ 80% C.I.
Patrol Cabin	0	23	65	12	7	43
Alkali Creek	0	22	78	0	8	49
Fall Creek	0	48	50	2	8	49
Fish Creek	0	37	59	4	8.2	49
Dog Creek	0	20	70	10	2.2	30
Muddy Creek	0	56	42	2	2	30
Upper Green	0	40	54	6	4	30

The following “Disturbance Classes” are based on visual observations made at each point along each transect:

- Class 0 indicates that no disturbance has occurred
- Class I indicates that compaction in the surface layer is greater then that observed under natural conditions and erosion is minimal.
- Class II indicates that increased compaction is present in the 10–30 centimeter range, platy structure is generally continuous, large roots may penetrate the platy structure, but fine and medium roots may not.
- Class III indicates that compaction is continuous deep in the soil profile (more than 30 centimeters). Erosion and other signs of soil movement are evident. Platy structure is continuous and large roots do not penetrate. (R1 Soil Quality Monitoring Protocol 2007).All seven feedgrounds analyzed in this document currently have less than 15 percent of their areas in a detrimentally disturbed soil condition (defined in FSH 2509.18 Chapter 2).

Detailed results for each transect within a feedground are available in the soils specialists report in the project record. Continuing winter elk management activities on the feedgrounds would likely maintain the current level of impacts. In Alternative 2, detrimental soil disturbance is expected on 27.13 acres.

All of the sites where feeding occurs directly on NFS lands had a noticeably thick organic surface horizon due to manure inputs. This layer ranges from about 6-10 centimeters and was noted, but not considered detrimental to soil resource condition. The soil resources in

the activity areas are moderately compacted due to the current use as elk feedgrounds, plus cumulative effects from other uses such as cattle grazing. Some of the areas, such as Dog Creek and Upper Green River, are naturally more resistant to compaction than other sites due to inherent soil characteristics.

3. Direct and Indirect Effects of Alternative 3 – Proposed Action

Under Alternative 3, increasing the size of Fish Creek and Muddy Creek feedgrounds and extending Patrol Cabin Feedground onto NFS land would extend the soil compaction impacts to 136 acres of land previously not directly used for elk management. While the additional impacts are expected to be within acceptable ranges for detrimental soil disturbance, the soils found on the Yellow Jacket Flat area are very susceptible to compaction due to the clayey surface textures. Soil compaction may be severe if elk are present for prolonged periods during wet periods. Detrimental soil disturbance is expected on 37.14 acres in Alternative 3.

4. Cumulative Effects

Potential cumulative effects related to soil resources for the Winter Elk Management Activities Special Use Permit Proposal were considered within the Analysis Area – the area within 1 mile of each feedground. This area was chosen for analysis of potential cumulative effects because resource specialists noted that the vegetative impacts of browsing were noticeable (in decreasing magnitude) up to 1 mile from the feedground. The area of vegetation impacts would correlate to the area of soil impacts, since soil impacts are related to compaction from concentrated elk use.

Past, present, and reasonably foreseeable management actions that could compact or erode soil resources in the Analysis Area include livestock grazing, vehicular use on roads, off road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping. Off road vehicle use and cross country foot travel related to antler hunting in May and June is another action that affects soil resources within the area within and adjacent to feedgrounds. Table 6 displays data about management actions.

Table 6. Information Related to Soils Resources Considered in the Cumulative Effects Analysis

Acres of NFS lands within the Project Area	**0 Acres Alt 1** **487 Acres Alt 2** **573 acres Alt 3**
Acres of NFS lands within the Analysis Area	**19,509 Acres**
Authorized Feedgrounds within Active Grazing Allotments or Forage Reserves	**Alkali Creek, Fall Creek, Muddy Creek, Patrol Cabin, Upper Green River Lakes**
Acres of Active Grazing Allotments within the Analysis Area	**15,603 Acres**
Miles of Roads within the Analysis Area	**69.1 Miles**
Miles of Trail within the Analysis Area	**15.6 Miles**
Feedgrounds Popular For Dispersed Recreation	**Dog Creek, Fall Creek, Muddy Creek, Patrol**

and Camping or Used For Administrative Uses Cabin

Detrimental soil disturbance is a concern because it reduces the productivity of the land and affects water quality. The detrimental soil disturbance analysis described in the existing conditions and alternative comparison sections of this report includes the combination of effects of all management actions within the Project Area. This includes impacts from winter elk management, livestock grazing, dispersed camping use, and motorized and non motorized travel on and off roads and trails. All of the Project Area met Regional Standards for detrimental disturbance of less than 15%. Impacts to soil resources decreased within the Analysis Area with increased distance from the feedground. Therefore, detrimental disturbance within the Analysis Area would be less than within the Project Area.

The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to soil resources.

Vegetation

A. Issues to be Addressed

Issue #2. Use of the feedgrounds concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush and in aspen and willow stands associated with riparian/wetlands. Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.

B. Existing Conditions

Alkali Creek Feedground: At the Alkali Creek Feedground, the vegetation community consists mainly of grasses and some scattered aspen, conifer, and sagebrush.

Effects on vegetation **Aspen stand in feedground**

Figure 18. Alkali Creek Feedground

Dog Creek Feedground: At this site, the vegetation community contains an overstory of mature cottonwoods. Brome grass is the primary understory species, but willows, roses, serviceberry and cattails are present.

Aspen and cottonwood stand **View across feedground**

Figure 19. Dog Creek Feedground

Fall Creek Feedground: At this site, the vegetation community consists mostly of brome grass and scattered sagebrush.

View of National Forest land adjacent to feedground.

Figure 20. Fall Creek Feedground

Fish Creek Feedground: At this feedground, the vegetation community primarily consists of elk sedge, brome grass, and scattered sagebrush and cinquefoil.

Near 100% ground cover. **View of sheds and corral**

Figure 21. Fish Creek Feedground

Muddy Creek Feedground: At the Muddy Creek Feedground, the vegetation community consists primarily of a mix of brome grass, red top, basin wild rye, and crested wheatgrass. A few scattered annual mustard species are present. Aspen occurs along the creek, dying in a few places, but regenerating stems are also present.

View of sheds and corrals. **View upstream across feedground area.**

Figure 22. Muddy Creek Feedground

Patrol Cabin Feedground: On the Patrol Cabin Feedground, the vegetation community consists primarily of basin big sagebrush and Idaho fescue.

View of feedground and barns.

View upstream of tributary to Gros Ventre River

Figure 23. Patrol Cabin Feedground

Upper Green River Feedground: The vegetation community on the Upper Green River Feedground consists primarily of brome grass with scattered sagebrush and cinquefoil.

View across feedground, up the Green River Valley. View across feedground.

Figure 24. Upper Green River Feedground

Plant Management Indicator Species

Management Indicator Species (MIS) are those species whose population changes are believed to reflect the effects of land management activities. Six Sensitive Plant Species and one Ecological Indicator Species (aspen) are considered MIS on the BTNF. The six sensitive plants are not known or suspected to occur in the Project Area. Quaking aspen is found throughout Wyoming's major mountain ranges and makes up about 9 percent of the total forested land base on the BTNF. Aspen is generally considered a seral species in the Rocky Mountain Region, rapidly pioneering disturbed areas, but eventually being replaced by more shade-tolerant conifers.

Aspen is found throughout the Analysis Area in small scattered stands consisting primarily of mature to over-mature trees with very little regeneration. About 985 acres of aspen are found within the Analysis Area (1 mile radius from the feedgrounds. Most aspen within the Analysis Area is impacted by elk (over-browsed and debarked trees).

C. Effects of the Alternatives

Assessments of vegetative impacts from winter elk management in the Project Area and in the Analysis Area suggest that where elk are fed, vegetation species richness and diversity are reduced, and occurrence and production of exotic grass species (e.g.,

smooth brome, *Bromus inermis*) is increased (Dean and Hornberger 2006). Shrubs of low palatability (e.g., sagebrush, *Artemesia spp*.) are typically killed and excluded from feedgrounds by repetitive crushing or trampling from trucks/trailers, horses/feed sleighs, and/or elk. When present, shrubs (e.g., serviceberry, *Amelancher alnifolia*) and trees (e.g., aspen, *Populus tremuloides*) of greater palatability are often stunted or killed from intense browsing and trampling. Although moderate accumulation of litter (feces, unconsumed hay) can fertilize and stimulate plant growth, deep accumulation is sometimes present on various areas within feedgrounds, inhibiting vegetation diversity and productivity. Feedgrounds with relatively small feeding areas, high numbers of elk, and long feeding seasons typically have larger areas of deep litter accumulation. Vegetative impacts are diminished on sites where winter elk management has been discontinued for 20 to 30 years (Dean and Hornberger 2006).

Species Richness and Diversity

High duration and/or high frequency grazing by native ungulates on herbaceous vegetation can alter species composition (Kay and Bartos 2000) and increase dominance by exotic grasses (Kay 1990, from Kay and Bartos 2000). Areas within any vegetation community that receives frequent disturbances typically have altered, often reduced, species richness and diversity (Dale et al. 2000). Although observed species richness did not statistically differ, there were greater numbers of grass, forb, and shrub species encountered on reference (undisturbed) sites than feedground (disturbed) sites (Figures 25 and 26). Species diversity indices indicated differences between feedground and reference sites on Dog Creek, Muddy Creek, and Upper Green River sites. These results suggest that increased levels of disturbance on feedground sites result in decreased species diversity.

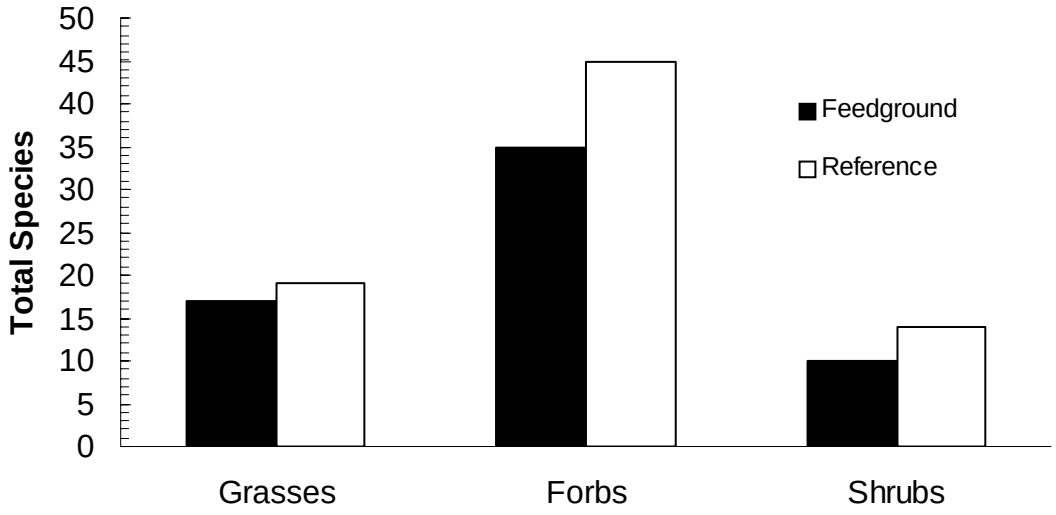

Figure 25. Total grass, forb, and shrub species encountered on feedground and paired reference sites on USFS lands, western Wyoming. Species richness does not differ ($\chi^2_{2, 140} = 0.20$, P = 0.90) among categories between feedground and reference sites.

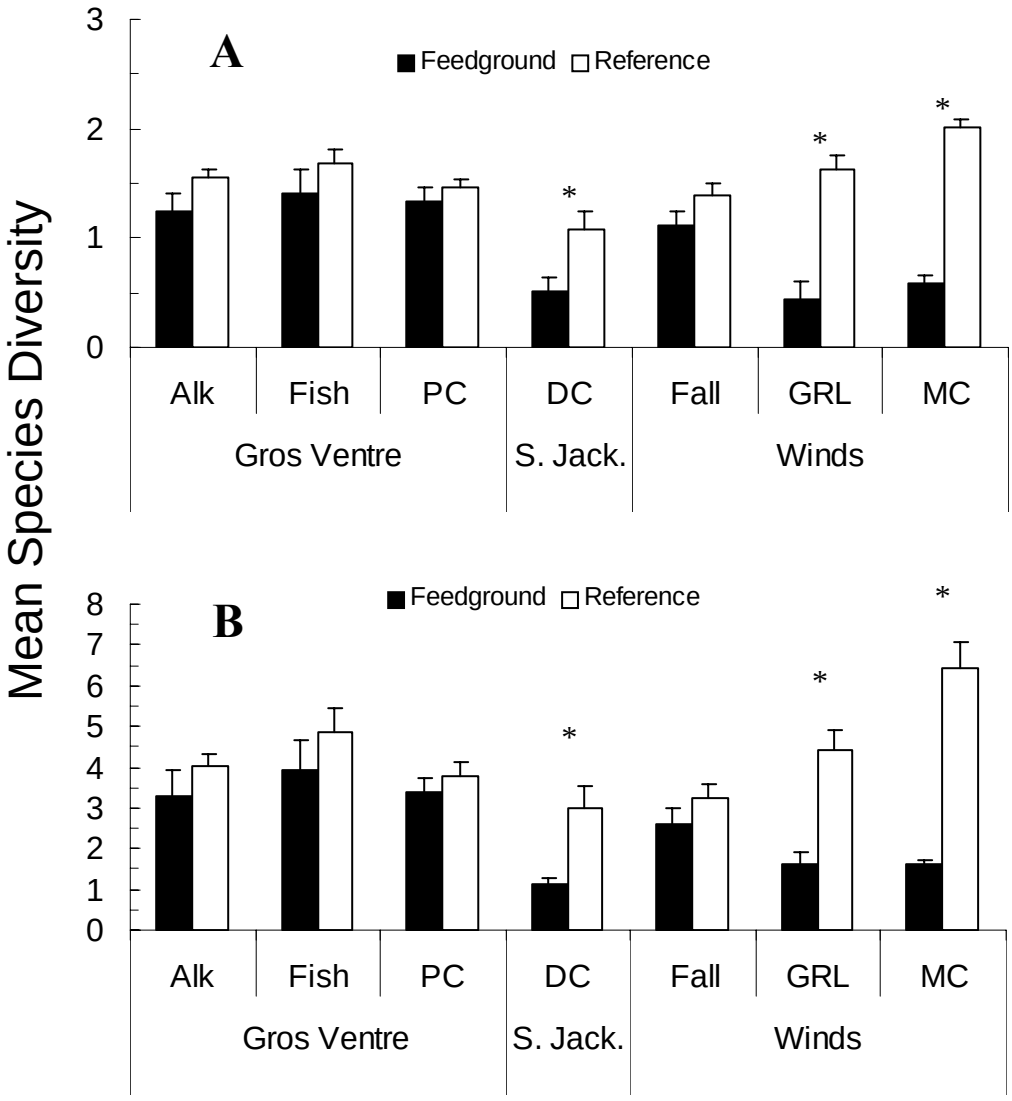

Figure 26. Mean Shannon-Wiener (A) and Simpson's (B) species diversity indices on USFS lands of Alkali (Alk), Fish Creek (Fish), Patrol Cabin (PC), Dog Creek (DC), Fall Creek (FC), Green River Lakes (GRL), and Muddy Creek (MC) feedgrounds and respective paired reference sites within the Gros Ventre River drainage, south Jackson (S. Jack.) area, and Wind River Range, western Wyoming. Shannon-Wiener ($F_{13, 140}$ = 11.56, P < 0.001) and Simpson's ($F_{13, 140}$ = 9.00, P < 0.001) indices differed among sites. "*" denotes difference (P ≤ 0.007) between individual feedground and respective paired reference site.

Basal Ground Cover

Previous research has shown that on sites within aspen/sagebrush ecotypes, basal cover of litter (primarily plant matter) increases with exclusion of grazing/browsing by native ungulates and livestock (Kay and Bartos 2000). On feedgrounds, however, qualitative visual observations have suggested that areas on some feedgrounds have extreme loads of litter (i.e., elk feces, unconsumed hay) resulting from numerous years of deposition. Excessive deposits of litter may preclude growth of some vegetation species, reduce species richness and diversity, and provide conditions where some vegetation species (i.e., noxious and invasive weeds) can dominate (Dean and Hornberger 2006). These excessive deposits of litter due to winter elk management could exacerbate cumulative impacts from livestock grazing on riparian and adjacent areas (USDA Forest Service 1990, pp 334). Refer to technical report for basal ground cover specifics.

Shrub Densities and Composition

Qualitative visual assessment of impacts to shrub communities on feedgrounds has suggested that winter elk management operations reduce or completely exclude shrubs from most areas on feedgrounds (Dean and Hornberger 2006). Sagebrush communities that receive chronic disturbances at short intervals typically have low densities of young shrubs or no shrubs at all, and are often converted to vegetation communities dominated by herbaceous, primarily grass, species (Figure 27). The relatively high shrub densities observed on feedgrounds within the Gros Ventre River valley may be explained by minimal feedground operation disturbances on NFS lands encompassing those feedground areas.

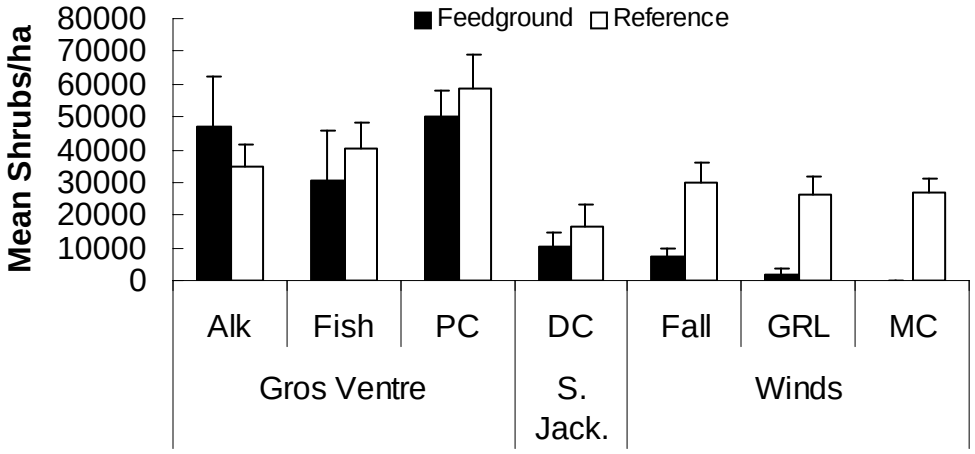

Figure 27. Mean (+SE) density of shrubs encountered on USFS lands of Alkali Creek (Alk), Dog Creek (DC), Fall Creek (FC), Fish Creek (Fish), Muddy Creek (MC), Patrol Cabin (PC), and Green River Lakes (GRL) feedgrounds and respective paired reference sites within the Gros Ventre River drainage, south Jackson (S. Jack.) area, and Wind River Range, western Wyoming.

Assessments of indirect vegetative impacts to areas off of and adjacent to elk feedgrounds suggest that browsing of palatable shrubs and trees and consumption of herbaceous forage are extensive up to 1 mile from the feedground, often impacting the seral-stage of vegetation communities (WGFD unpublished data). Vegetative impacts based on visual estimation are generally limited to 2 kilometers from feedgrounds (Dean and Hornberger 2006).

Aspen browse-use in treatment areas substantially decreased on transects greater than 1.6 kilometers from Soda Lake feedground near Pinedale, Wyoming (WGFD, unpublished data). Conversely, browse use on aspen stands 1.6 to 6.4 kilometers from Jewett Feedground along the Wyoming Range front show that use levels did not decrease. However, in most cases, based on visual estimates, vegetative impacts are limited to 2 kilometers from feedgrounds. Browse-use within this 2-kilometer range surpassed 20 percent, and production of new sprouts (suckers) did not exceed 2,361 stems/hectare; 83 percent of these stems are less than 1 meter in height, suggesting low regeneration (WGFD, unpublished data).

Effects on aspen stands in the feedgrounds' vicinities consist of over-browsed and debarked trees. These effects would continue under these two alternatives. Stands closest to the winter elk management areas would eventually be lost due to excessive use by elk. Aspen within 1.6 kilometers of the feedgrounds make up a small percentage of the amount of aspen in the affected watersheds. Therefore, local impacts (individual stands) are severe, but overall impacts to aspen on a landscape scale are small.

Noxious Weeds

Occurrence of noxious weeds on feedgrounds is currently minimal (Dean and Hornberger 2006), likely due to successful efforts by WGFC to identify and control weed infestations promptly. Implementation of the mitigation measures described in Chapter 2 concerning weeds should result in continued minimal evidence of weeds.

1. Direct and Indirect Effects of Taking No Action (Alternative 1 – No Special Use Authorization)

If winter elk management is discontinued at Alkali Creek, Fish Creek, Muddy Creek, and Upper Green River feedgrounds, vegetation would increase in diversity and shrub densities. Observations on previously fed upon areas suggest that vegetation would revert to a more natural, pre-feeding condition after 20-30 years (Dean and Hornberger 2006).

Some of the aspen stands in the Analysis Area would recover over time, but given the current condition of the stands within 1.6 kilometers of the feedgrounds, some would never recover and would be lost as the stands die. The amount of currently decadent aspen that would be expected to die is extremely small and would not affect habitat requirements for any other species of plant or animal.

Winter elk management would continue to occur adjacent to NFS lands at Dog Creek, Fall Creek, and Patrol Cabin Feedgrounds, therefore vegetation effects would continue in Alternative 1 on NFS lands within 1.6 kilometers of these feedgrounds.

These areas would also continue to be vulnerable to invasive species; however standard operating procedures in place by the WGFC are expected to be effective in controlling any infestation that occurs.

2. Direct and Indirect Effects under Alternative 2 – No Change from Current Permitted Area

The existing feedgrounds have been in operation for over 50 years. The impacts to the vegetation described earlier in this section are the result of that operation. The situation appears stable. No additional impacts are expected over time for the 467 acres in the existing feedgrounds and the Analysis Area surrounding them.

3. Direct and Indirect Effects under Alternative 3 – Proposed Action

Under Alternative 3 – the Proposed Action, 135 acres of NFS lands are added to the feed areas at Fish Creek, Muddy Creek, and Patrol Cabin feedgrounds. One acre is requested at Muddy Creek Feedground for the addition of a horse corral. Although these acres have already been affected by the winter elk management that has occurred over the past 50 years on adjacent lands, additional impacts would occur as feed is distributed over these new areas. Plant species diversity and shrub density would decrease in the long-term within the additional area to mimic that of existing conditions on areas where feeding has occurred for many years. A total of 573 acres would be affected within the Project Area for this alternative. A small amount of vegetation within the Analysis Area (1 mile) would have increased effects in relationship to this increased area.

4. Cumulative Effects

General impacts of winter elk management on vegetation communities are the conversion of sagebrush upland, aspen, and willow/cottonwood riparian ecotypes to those dominated by herbaceous species, primarily grasses, with reduced species richness and diversity. The potential for cumulative effects related to vegetation resources for the Winter Elk Management Program Special Use Permit Proposal was considered within the Analysis Area – the area within 1 mile of each feedground. Past, present, and reasonably foreseeable management actions that could convert sagebrush uplands and willow/cottonwood riparian ecotypes in the Analysis Area include livestock grazing, sagebrush herbicide treatment (SPIKE), and prescribed fire. Wildfire is not a management action; however its effect is similar to prescribed fire. Off road vehicle use and cross country foot travel related to antler hunting in May and June is another action that affects vegetation resources within the area within and adjacent to feedgrounds. Table 7 displays data about wildfire and the management actions by Alternative.

Table 7. Information Related to Vegetation Resources Considered in the Cumulative Effects Analysis

Acres of NFS lands within the Project Area	**0 Acres Alt 1**	
	437 Acres Alt 2	
	573 acres Alt 3	
Authorized Feedgrounds within Active Grazing Allotments or Forage Reserves	**Alkali Creek, Fall Creek, Muddy Creek, Patrol Cabin, Upper Green River Lakes**	
Acres of NFS lands within the Analysis Area	**19,509 Acres**	
Acres of active grazing allotments within the Analysis Area	**15,603**	
Acres of Sagebrush Treatment within the Analysis Area	**564 Acres (Spike near Fall Creek Feedground in 1998)**	
Acres of Wildfire within the Analysis Area within the past 30 years	**6,717 Acres**	
Acres of Prescribed Fire within the Analysis Area within the past 30 years	**1,868 Acres**	
Acres by Vegetation Type Within the Analysis Area	**985 Acres**	**Aspen**
	64 Acres	**Aspen/Conifer Mix**
	211 Acres	**Cottonwood**
	788 Acres	**Grassland/Forbland**
	11,515 Acres	**Mixed Sagebrush**
	126 Acres	**Mountain Shrubland**
	304 Acres	**Riparian Herbland**
	1,391 Acres	**Willow**

All of the analyzed feedgrounds are located near water and in some locations typically experience an increase in herbaceous production from increased fertilization due to moderate accumulations of concentrated elk feces. These aspects contribute to make feedground sites attractive for cattle grazing. Four of the feedground Project Areas are within active livestock grazing allotments (Fall Creek, Muddy Creek, Patrol Cabin, and Upper Green River Lakes). Alkali Creek, Dog Creek, and Fish Creek are not within active allotments, but livestock from adjacent allotments have been known to graze at Alkali and Fish Creek Feedgrounds. Thus, observed impacts to vegetation on feedgrounds are not entirely due to winter elk management operations alone. High duration and/or high frequency grazing by livestock can substantially alter vegetation communities (Belsky et al. 1999) and reduce species richness (Fleischner 1994).

The cumulative effect of livestock grazing in combination with continued heavy browsing by elk in the winters could prevent suppressed willow plants in wet meadow habitat from recovering to a healthy condition within and adjacent to feedgrounds. Approximately 1,400 acres of willow habitat are located within the Analysis Area (one mile radius) of the feedgrounds, but the most severe impacts would likely occur only within the 150 acres of riparian habitat that occur within and immediately adjacent to the Project Area. Past livestock grazing and elk feedground use has also cumulatively affected the suppression of sagebrush and other mountain shrubland growth within the Project Area and a small portion of the Analysis Area immediately adjacent to the Project Area. Approximately 86 acres NFS lands are proposed to be added to the Project Area in Alternative 3. Conversion from sagebrush, mountain shrubland, and willow habitat to grassland habitat would be expected on these acres as a cumulative impact of elk feedground use and livestock grazing.

The impacts to sagebrush created by herbicide treatments, wildfire and prescribed fire are temporary. Natural succession will result in treated or burned areas becoming vegetated with grass and forbs, then transitioning to sagebrush upland or willow/cottonwood riparian ecotypes over time. No cumulative effects are expected from the combination of winter elk management activities and past sagebrush conversion projects and past, present or future prescribed fire or wildfire events.

The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to vegetation resources.

Hydrology

A. Issues to be Addressed

Issue #2. Use of the feedgrounds concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush and in aspen and willow stands associated with riparian/wetlands. Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.

Issue #3. Use of the feedgrounds concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures. Alternatives are compared in this analysis by considering the existing condition of stream banks within and adjacent to the feedgrounds, then comparing the extent of stream banks potentially affected by the alternatives.

B. Existing Conditions

The hydrology Analysis Areas used for this project consist of the feedgrounds and nearby (generally within 200 feet) water bodies, riparian areas, and wetlands that may be affected by actions associated with the alternatives. Other activities within 1 mile of the feedgrounds are also considered if they may cumulatively impact streams, wetlands, and riparian areas.

Field visits were made to all the feedgrounds during fall 2007. Observations of riparian and stream channel conditions, along with photographs of conditions, provide the basis for information provided in this report.

Wetlands and riparian areas: Two data sources are used to show potential wet areas on maps in this report. The first data source is the Bridger-Teton National Forest 2007 vegetation map. Dominant land cover, canopy closure, and tree size classes are mapped to a scale of 1:100,000, based on field survey and remote sensing data. Riparian areas are mapped down to a minimum polygon size of two acres (upland vegetation is mapped down to five acres). Riparian map groups include areas dominated by cottonwoods, riparian herblands, and willows.

The second data source is the National Wetlands Inventory (NWI). The NWI was created, and is managed, by the U.S. Fish and Wildlife Service, which is the principal federal agency responsible for providing information to the public on the extent and status of the nation's wetlands. The NWI is comprised of maps showing different types of wetlands, based on USGS 7.5-minute quadrangle maps. Source imagery for the NWI is from the 1980's for the portions of the Bridger-Teton National Forest that have been mapped (most, but not all, of the forest has been mapped and digital data are available). Three main systems of wetlands occur in the feedground areas: the names of these wetland systems are displayed in the map legends in this report, but the systems are not differentiated. The systems are (Cowardin et al., 1979):

- Lacustrine: The lacustrine system includes lakes and reservoirs, including intermittent lakes and dammed river channels.
- Palustrine: The palustrine system includes wetlands traditionally called such names as marshes, swamps, bogs, fens, and prairies. It also includes small, shallow, permanent or intermittent water bodies (ponds). Palustrine wetlands may be shoreward of lakes or river channels, in floodplains, in isolated basins, or on slopes. They may occur as islands in lakes or rivers, too.
- Riverine: The riverine system is located in stream channels. Water is usually, but not always, flowing through this system.

Floodplains: Base (or 100 year) floodplains are mapped by the Federal Emergency Management Agency (FEMA), and information is available on Flood Insurance Rate Maps (FIRMs) which cover feedgrounds in Teton County (available at http:www.bepreparedtc.com/Flood). Feedgrounds in Sublette County are not covered by FIRMs: mapping excludes NFS lands.

Water Quality: There are no 303(d) listed streams associated with any of the feedgrounds. These are streams where the Wyoming Department of Environmental

Quality has determined that water quality is either impaired or threatened. The list is updated every two years as required by Section 303(d) of the federal Clean Water Act. In addition, no municipal watersheds are associated with any of the feedgrounds. Water quality data cited in this document was collected by Sublette County Conservation District.

Alkali Creek Feedground: There are no perennial streams within the Alkali Creek Feedground and no intermittent channels were seen during the field visit. No base floodplains are affected by use of this feedground. Two areas totaling two acres were mapped as wetlands in the National Wetlands Inventory (NWI). (Figure 28).

The first mapped wetland is immediately north of the hay sheds. It is a grassed swale that may be a seasonal wetland; it was dry at the time of the field visit (September 12, 2007). Willow, sedges, and grasses are present here, and the wetland is in good condition. Vegetation is robust and there is no excessive erosion taking place. A second wetland is at the north end of the feedground. It is a dry depression without wetland characteristics where elk feed (hay) has been scattered. As a consequence of elk use in the winter and livestock use in the summer, vegetation in this area is trampled and large areas of bare soil are exposed. (Figure 29).

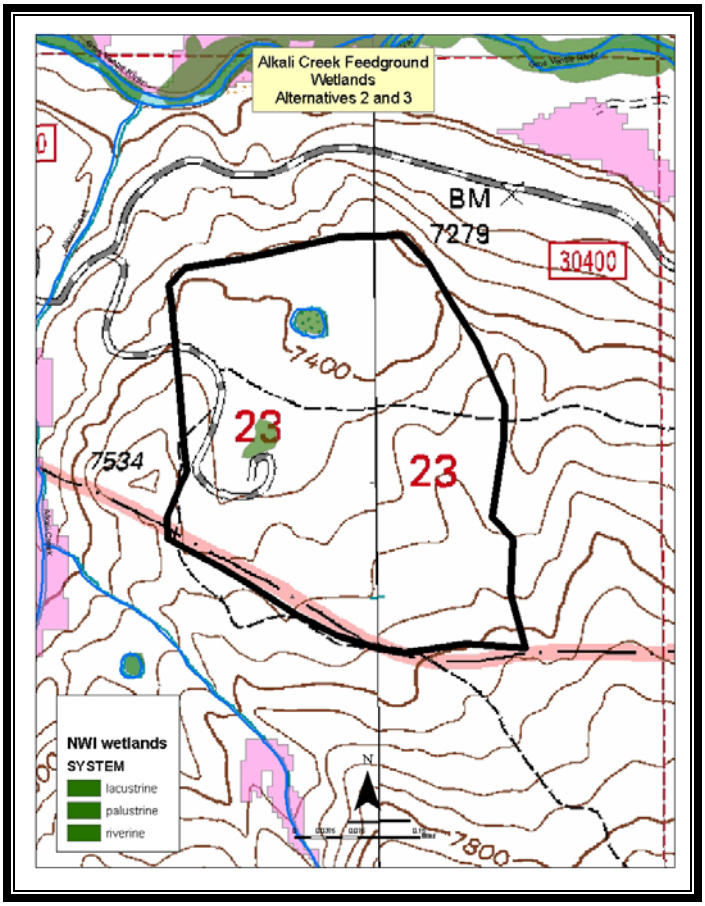

Figure 28. Alkali Creek Feedground and NWI wetlands

Figure 29. Alkali Creek Feedground concentration area

Dog Creek Feedground: This feedground is located in the Snake River Canyon, within the 100-year floodplain of the Snake River as mapped by FEMA on FIRMs. Mapped wetlands and riparian areas totaling 66 acres overall are shown in Figure 30.

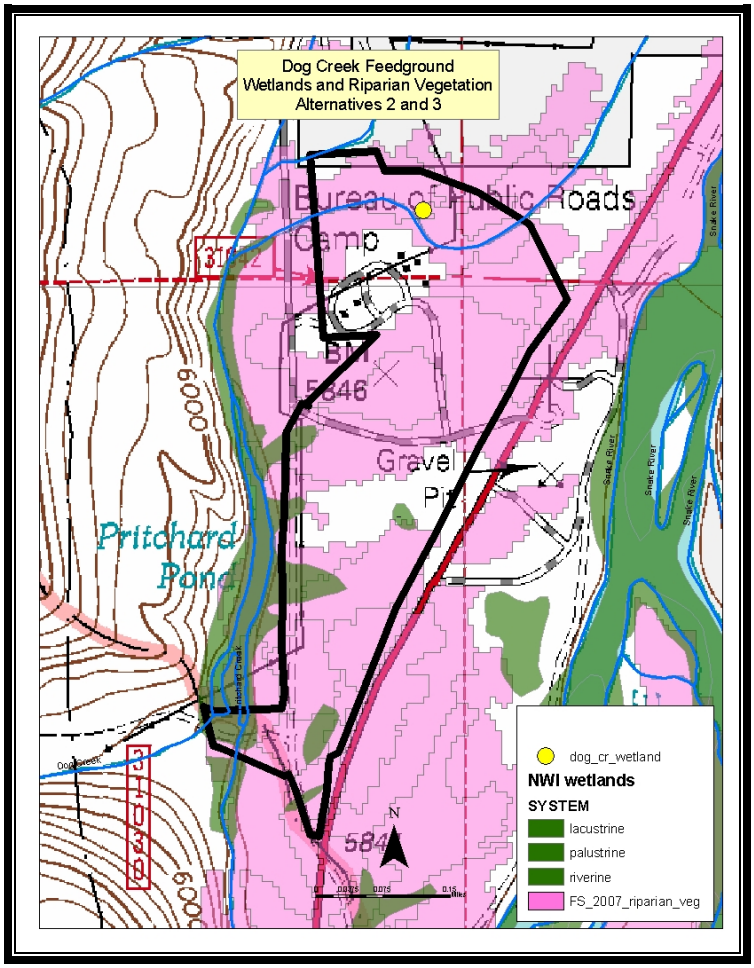

Figure 30. Dog Creek Feedground wetlands and riparian vegetation

The northern portion of the feedground consists of abandoned Snake River stream channels that are now vegetated swales. Most of the area is vegetated with grasses and cottonwoods (many are decadent, although some sprouting is taking place) and is used as a horse pasture. Cottonwood regeneration is inhibited by browsing. One small wetland is located in the northwest portion of the feedground, in one of the old channels; it is about 400 square feet in size and is indicated in Figure 30. Mint and willow were found at the site, and the soils were very dark and moist on September 20, 2007. No trampling was evident at the wetland.

Another possible seasonal wetland was mapped in the National Wetlands Inventory. The vegetation consists of a large stand of reed canary grass (probable identity) and it is located in a low spot near the center of the feedground.

Wetlands exist throughout the southern half of the feedground area. These are associated with the open water along Pritchard Creek on the western edge of the feedground, extending well into the feedground boundary. Wetlands are also found adjacent to scattered ponds near the southern tip of the feedground. No measurable impacts to these areas from elk were noted.

Pritchard Creek Pond and Pritchard Creek are both classified as Class 2AB waters by Wyoming DEQ (http://deq.state.wy.us/wqd/WQDrules/Chapter_01.pdf). Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters are also protected for non-game fisheries, fish consumption, and aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value uses.

Water quality is not apparently being degraded by elk feedground operations. Riparian areas are in overall good condition. There are no visible signs of nutrient enrichment and elk do not appear to be congregating near open water bodies.

Fall Creek Feedground: There are no important water bodies within the feedground; however Fall Creek is just north of the feedground boundary (within 150 feet). Riparian vegetation and the feedground boundary are shown in Figure 31. The USFWS has not yet inventoried wetlands in this area. The only apparent wetlands observed during site reconnaissance for this project were along Fall Creek, outside the Project Area. FEMA has not mapped floodplains on the BTNF in this area, but mapping downstream from the BTNF boundary, adjacent to the feedground, shows no floodplains mapped along Fall Creek. The northern portion of the feedground may be within the 100-year floodplain.

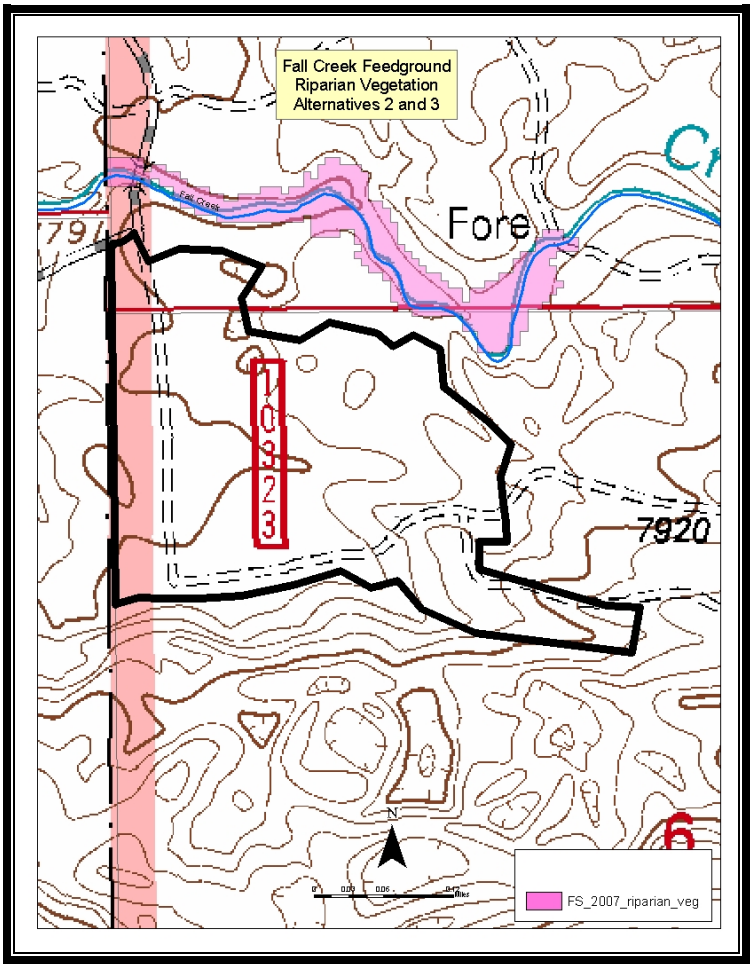

Figure 31. Fall Creek Feedground and riparian vegetation

While Fall Creek has good bed armor from cobble- and coarse gravel-sized materials, the banks are mostly fine-grained and susceptible to damage from trampling. The combination of dispersed camping, associated roads, cattle use, and elk use are causing trampled banks and compacted riparian soils, resulting in a widened channel with poorly defined banks (Figure 32). This change in channel cross-section is reducing the ability of the channel to effectively carry water flows and sediment loads. As a channel becomes over-widened, discharges of water that normally maintain the channel's shape ("bankfull" flows) are no longer as effective in maintaining the channel's form. This reduces the ability of the channel to carry sediment loads being delivered to the channel. Overbank (flood) flows also become less common, reducing floodplain and riparian functions. Lack of well established riparian vegetation is contributing to poor streambank condition and poor stream cover along reaches of the stream that do not have a tree overstory. The riparian condition and stream channel condition are in a downward trend.

Fall Creek is not classified by the Wyoming DEQ, but a nearby lake, Burnt Lake, is a class 2AB water. See information under the Dog Creek feedground for a description of this classification.

Figure 32. Fall Creek impacts

Fish Creek Feedground: The Fish Creek Feedground is located on the Gros Ventre River and portions of it are within the 100-year floodplain, as mapped by FEMA. Locations of GPS/photo points, mapped NWI wetlands, and riparian vegetation are shown in Figure 33. Sixty-one acres of the current feedground are mapped as either wetland or riparian.

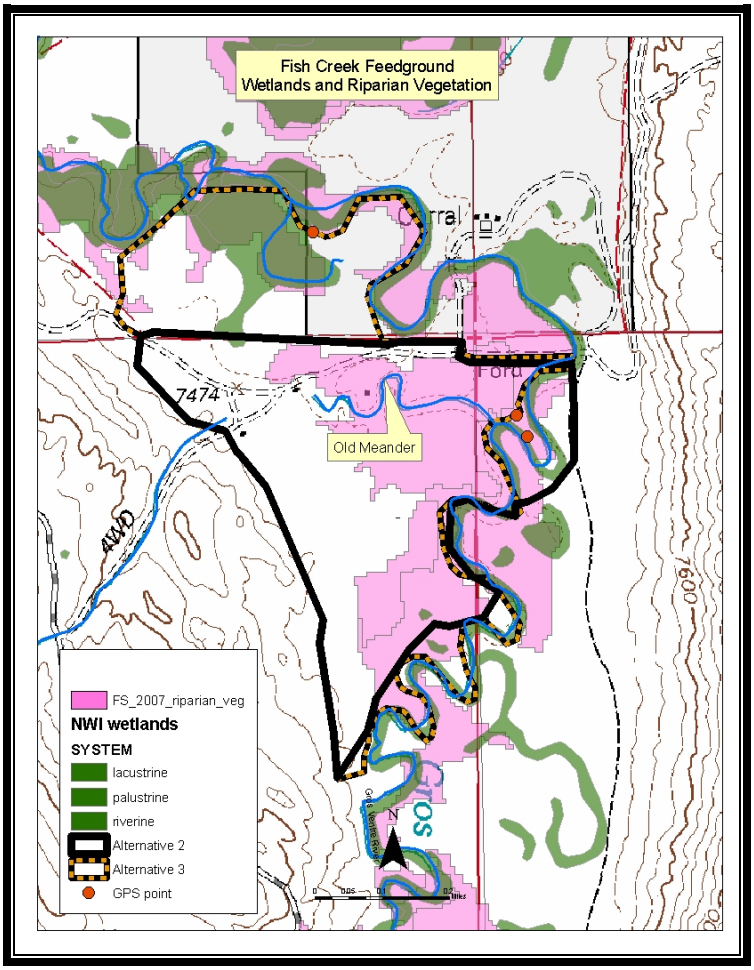

Figure 33. Fish Creek Feedground, wetlands, riparian vegetation, and GPS/photo points

Most of the stream banks of the Gros Ventre River along the east side of the feedground are unstable. This appears to be due to a combination of animal use and the stream's naturally dynamic nature. Observations within the current feedground area on September 10, 2007 found that there are long reaches of unstable (eroding) bank, and there is little instream cover from overhanging banks and from vegetation. Fish habitat surveys from 1998 stated that there were no more than 70% stable banks. 2003 fish habitat surveys in the same vicinity noted that 40% to 50% of the banks were stable. Comparison of these two surveys would indicate a downward trend in bank stability over time. The 2003 survey noted that grazing impacts from both elk and cattle were present.

Minor willow is present; it is very small in stature and very sparse. Vegetation roots are too shallow to hold banks effectively, especially on the outside of meanders (Figure 34). Point bars appear to be actively building, which is helping to maintain overall width-depth ratios as the banks erode.

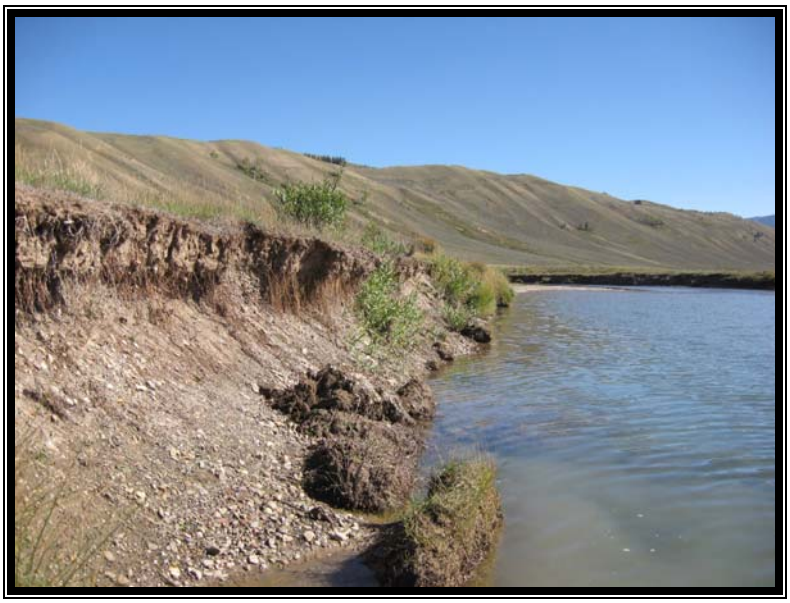

Figure 34. Unstable banks, shallow vegetation roots, along the Gros Ventre River. East side of Fish Creek Feedground.

Cattle and wildlife trail along the top of the left bank (facing downstream). There appeared to be little current year trampling, but trampling from previous years was evident and several areas of failed bank were associated with hoof prints and trails (Figure 35).

Figure 35. Animal trails, failed bank (and bank likely to fail in the future), hoof prints evident. East side of Fish Creek Feedground.

An old meander near the corral, in the north-central portion of the current feedground area (shown in Figure 33), has characteristics of both riparian and upland communities. It is likely seasonally wet, but was dry at the time of the field visit. Elk pellets were plentiful in the meander, but it is in good condition with no noticeable bare ground and no accelerated erosion taking place.

The Gros Ventre River, along the northern edge of the current feedground area, appears similar to the stream on the eastern side of the feedground: actively eroding banks, little cover, few willows, actively-building point bars. Trampling and vegetative damage from cattle and elk as well as natural stream characteristics, contribute to streambank instability.

An area adjacent to, but north of, the existing feedground is being proposed as an extension of the feedground (it is shown in Figure 33 as the polygon at the north of the feedground). It abuts the south bank of the Gros Ventre River downstream from the current feedground. Elk pellets were abundant in this area at the time of the field visit. As in the upstream reaches of the Gros Ventre River, banks were mostly unstable, there was little instream cover being provided by stream banks and vegetation, and there was little willow regeneration which is occurring primarily on point bars. The ground between the road and the river has been trampled while wet and, as a result, is very hummocky.

The abandoned meander south of the GPS point shown at the north end of the feedground in Figure 33, in the proposed expansion area, has sedge, grasses, and Potentilla anserina (a weakly facultative[4] wet plant that does not necessarily indicate riparian or wetland conditions). The abandoned meander may be seasonally wet but was dry at the time of the field visit.

The Gros Ventre River is classified as a class 2AB water by Wyoming Department of Environmental Quality. See information under the Dog Creek feedground for a description of this classification. No water quality data is recorded for the Gros Ventre River in the Environmental Protection Agency's storage and retrieval database or in Forest Watershed data files. In addition, there is no information about water quality data in the *Teton Division Landscape Scale Assessment* or in The Teton Conservation District files. The beneficial uses of water associated with the 2AB classification are being supported according to WGFD information available through the Bridger-Teton National Forest Fisheries department.

Muddy Creek Feedground: This feedground is located in a riparian area at the edge of the National Forest. It is long and narrow, concentrating use along Muddy Creek due to steep adjacent side slopes. Figure 36 shows riparian vegetation mapped by the Forest Service (a total of 6 acres); the USFWS has not inventoried wetlands in this area. No floodplains are mapped by FEMA on the National Forest in this area, but mapping immediately downstream from the Forest boundary does not indicate the presence of a notable floodplain along Muddy Creek.

[4] A plant that can live in wetlands but may also occur in drier environments.

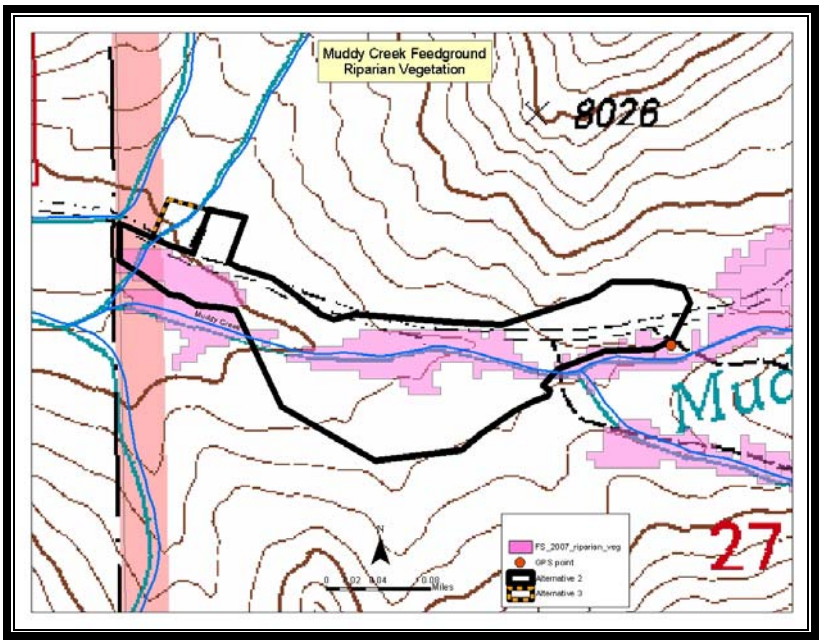

Figure 36. Muddy Creek Feedground, riparian areas, and GPS point

Livestock were present during the field visit on September 19, 2007. The stream channel was stable and riparian vegetation was robust upstream from (east of) the GPS point. At the GPS point, grazing impacts started to become evident: bank trampling and use of herbaceous vegetation became noticeable. Bedding areas near the creek were also evident here. Moving further downstream, trampling became more noticeable—more so than riparian vegetation utilization (Figure 37). Approximately 25% of the length of stream banks downstream from the GPS point was trampled at the time of the site visit. Trampling is leading to channel widening and increased susceptibility of the channel to erosion during spring runoff.

Figure 37. Muddy Creek Feedground, bank trampling

Impacts to riparian shrubs and aspen are also evident in the riparian area. The aspens in Figure 37 show that elk have been browsing on them. Shrubs decrease in vigor (become more decadent) and abundance moving downstream from the GPS point to the hay sheds (Figure 38).

Figure 38. View toward riparian area from hay sheds

Muddy Creek has not been classified by Wyoming DEQ, but Muddy Lake (in the stream's headwaters) is a class 3B. According to State water quality standards, "Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles." (available at http://deq.state.wy.us/wqd/WQDrules/Chapter_01.pdf) Muddy Creek appears to be supporting these designated beneficial uses, and so meets State water quality standards.

Patrol Cabin Feedground: The existing feedground is not on NFS land, but the two proposed additions are. Both sites were visited in 2007. The Project Area boundary, GPS points, National Wetlands Inventory wetlands, and riparian vegetation are shown in Figure 39. Three acres of the proposed addition south of the Gros Ventre River have riparian vegetation. The existing elk feedground includes a section

of the 100-year floodplain of the Gros Ventre River, but both proposed additions on National Forest land are outside the floodplain.

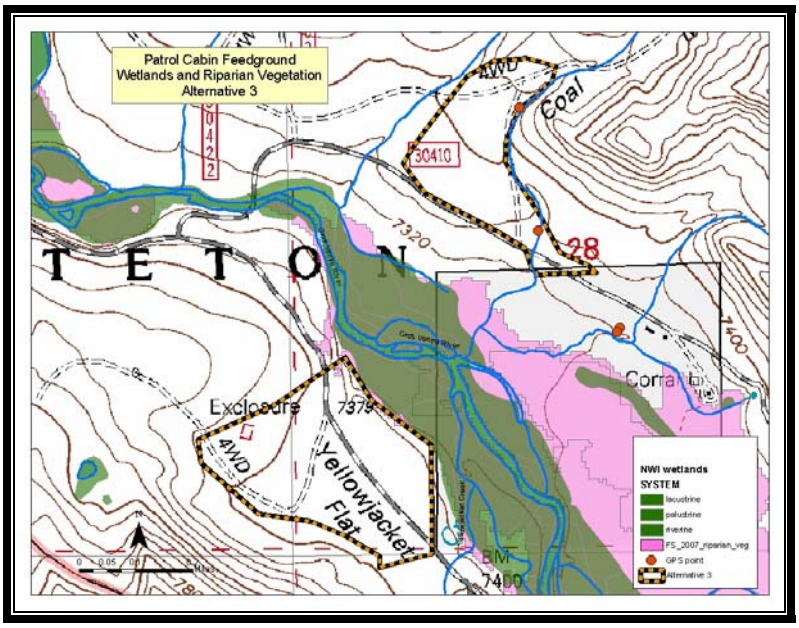

Figure 39. Patrol Cabin Feedground expansion areas

In Figure 39, the channel of Coal Mine Draw shown in the northern parcel is an intermittent, incised channel in a deep draw. Discontinuous headcuts are present in the lower reaches of the draw (just above and below the road) (Figure 40). The lowermost portion below the road (on State managed land) is an alluvial fan. There is no riparian vegetation along the channel and no evidence of heavy animal use. Elk are trailing along the terraces above the draw: there are trails that lead off side slopes, across the draw, and other trails along the draw edge on the terraces which contribute to erosion.

Figure 40. Headcut in lower Coal Mine Draw

There is a spring-fed stream on the current feedground on State managed land. A stream survey was conducted there in 2007, approximately 100m west of the hay sheds. The channel is sinuous with a gentle gradient, having predominantly fine gravel sized bed materials, and having very low bankfull width/depth ratios (Rosgen, 1996). Vegetation is the main source of bank stability for these streams and bank materials are typically finer than bed materials. Figure 41 shows the surveyed channel reach on State managed lands.

Figure 41. Patrol Cabin stream – surveyed reach.

While channel dimensions are within the normal range for the stream type, there is evidence that animal trampling is affecting the channel. The channel is downcutting. Bank full channel widths along the length of the study reach range from 3.3 feet to 14.0 feet (median of 5.6 feet), indicating that some portions of the channel are widening. The sites having the greatest widening are associated with recent hoof shears or areas of unstable banks from past impacts. Channel widening is one of the first signs of a decrease in channel function and floodplain function. In the case of this stream, maintenance of local water tables would be the most important floodplain function lost with channel widening. Overall, this stream is still functioning, but its condition is declining due to bank trampling. Banks are destabilized and downcutting is leading to the loss of water table and riparian vegetation extent.

The proposed southern parcel on NFS lands has an active, intermittent channel that leads to the Gros Ventre River. The site was visited on October 25, 2007 and water from a recent snowfall was present in the channel. The stream channel originates upstream (southwest of) the road as an area of ponding and shallow channels. Silver sage is present along the upper end of the channel, indicating possibly moist conditions (Figure 42).

Figure 42. Unnamed channel in the Patrol Cabin expansion, south parcel

Large numbers of elk pellets, and some cattle droppings, were seen in the meadow where the stream flows. The area, including streambanks, is being trampled and the channel loses its form as it flows through the meadow. Just above the road, the channel becomes incised and develops multiple channels, due, in part, to the effect of the road. The lower (northern) reach of the channel is actively cutting and material is raveling off the channel banks and adjacent side-slopes.

Upper Green River Feedground: The Upper Green River Feedground consists of two areas on either side of the Green River (Figure 43).

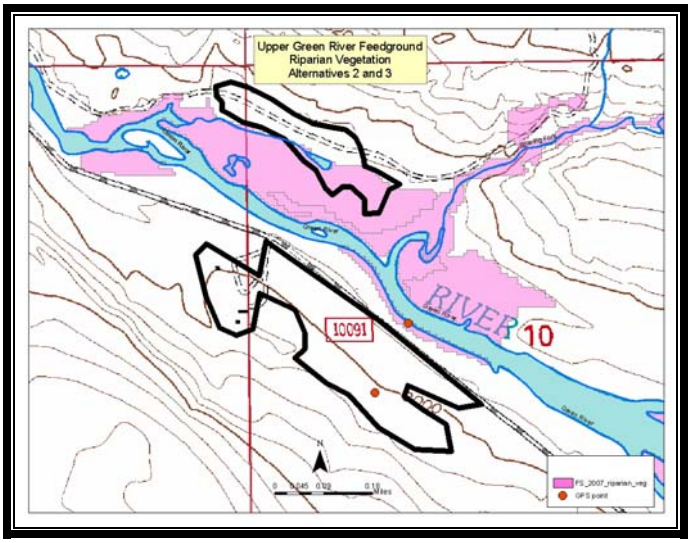

Figure 43. Upper Green River Feedground and riparian vegetation

The USFWS has not yet inventoried wetlands in this area; however, the BTNF vegetation survey documents five acres of riparian vegetation. Floodplains have not been mapped by FEMA on the BTNF in this area. The local reach of channel appears relatively straight with a moderately confined channel, high width-depth ratio, and a gravel/cobble-dominated bed. Stream banks on the Green River are comprised of finer materials than the main bed of the stream.

There were approximately 30 cattle in the feedground area at the time of the field visit (September 18, 2007). A potential riparian area is shown at the GPS point indicated within the southern portion of the feedground in Figure 43. The vegetation in this area (some rushes, very coarse grass) had been lightly grazed: there was abundant high stubble remaining. The ground in this area was hummocked, but was dry at the time of the field visit.

Observations made at the GPS point on the south bank of Green River showed very little sign of elk (almost no pellets). The wet areas along the stream were hummocky and willows were browsed; this appeared to have been from cattle. Drier areas having shorter grasses, poa, cinquefoil, Artemisia, and buckwheat, were not hummocked, but had abundant animal trails in the riparian area, and further shrub browsing. Banks were quite uniformly and freshly trampled by cattle (Figure 44).

Figure 44. Upper Green River-- trailing, trampling

On the north side of the river, the southeast portion of the feedground was mapped as having riparian vegetation by the Forest Service in 2007 (see Figure 43). This portion of the feedground area has quite a bit of hummocked ground, and was moderately grazed by cattle at the time of visit. The north bank of Green River is moderately unstable in this area.

Green River is a Class 1 water of the State from the mouth of New Fork River to the Wilderness boundary. Class 1 (Outstanding) Waters "are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Non-point sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of these regulations, the water quality and physical and biological integrity which existed on the water at the time of designation will be maintained and protected…" (WDEQ, 2001)

The Sublette County Conservation District (SCCD) has been sampling water quality on Green River and its major tributaries since 2001. The upstream-most sampling station, GR1, is located approximately 4.5 miles upstream from the project area, 0.5 mile downstream from the outlet of lower Green River Lake. A second sampling site, GR2, is located approximately 1.5 miles upstream from the National Forest boundary, downstream from Kendall Warm Springs and Stinky Spring, and approximately 12 miles downstream from the project area. Among other parameters, temperature, turbidity, total suspended solids (TSS) and nutrients (an indicator of fecal enrichment) were sampled. Sampling results for the stretch of the Green River on NFS lands indicate that management activities are not having a measurable impact on water quality, and water quality is meeting State standards.

C. Effects of the Alternatives

It is widely known that bank alteration by livestock trampling can be an important source of stream channel and riparian degradation (e.g., Clary and Webster, 1989, 1990; Belsky, et al., 1999). Impacts may include channel widening (and loss of ability of flood flows to access floodplains), loss of riparian vegetation (which then makes banks more vulnerable to further erosion), localized lowering of water tables in riparian areas (and loss of water storage in floodplains and stream channels), and changes in sediment transport capacity.

Effects attributed to operation of the feedgrounds as described below are based on observations of existing conditions and impacts, and information from WGFC on elk behavior in the feedgrounds. Effects of trampling and riparian vegetation use on stream channels are based on knowledge gained from grazing allotments (and other management activities) and cited in the literature, behavior of various stream types and their responses to management activities (as described in Rosgen 1996), and observations made in the field. Water quality impacts are based on whether BMPs are being met. Where BMPs are effective in maintaining riparian conditions, water quality would be expected to follow suit. In the case of Green River, existing data are used to evaluate impacts to water quality. Table 8 displays the distance of stream channel and acres of riparian vegetation within the Project Area potentially affected by feedground use by Alternative.

Table 8. Stream Channel Distance and Acres of Riparian Vegetation in the Project Area on NFS lands Potentially Affected by Alternative

Feedground		Alt 1	Alt 2	Alt 3
Alkali Creek	Stream Distance	0 feet	0 feet	0 feet
	Riparian Vegetation	0 acres	1 acre	1 acre
Dog Creek	Stream Distance	0 feet	0 feet	0 feet
	Riparian Vegetation	0 acres	66 acres	66 acres
Fall Creek	Stream Distance	2,300 feet	2,300 feet	2,300 feet
	Riparian Vegetation	0 acres	0 acres	0 acres
Fish Creek	Stream Distance	0 feet	1 mile	2 miles
	Riparian Vegetation	0 acres	61 acres	70 acres
Muddy Creek	Stream Distance	0 feet	2,540 feet	2,540 feet
	Riparian Vegetation	0 acres	6 acres	6 acres
Patrol Cabin	Stream Distance	0 feet	0 feet	1,600 feet
	Riparian Vegetation	0 acres	0 acres	0.5 acres
Upper Green River	Stream Distance	0 feet	3,850 feet	3,850 feet

	Riparian Vegetation	**0 acres**	**5 acres**	**5 acres**
Total	**Stream Distance**	**0.64 miles**	**2.85 miles**	**4.26 miles**
	Riparian Vegetation	**0 acres**	**140 acres**	**149.5 acres**

1. Effects of Taking No Action (Alternative 1 – No Special Use Authorization)

Alkali Creek: There is no non-NFS land adjacent to this feedground. Therefore if the WGFC continued to feed elk on private, state, or other federal land, it would be far enough away that this area would no longer be affected. If use of this feedground was no longer authorized, riparian vegetation would recover on a one acre portion of the site that is currently trampled with bare soil exposed. There are no stream channels affected at this feedground.

Dog Creek: The only impacts due to current winter elk management on riparian areas or hydrological function at this feedground are in the northern portion of the feedground (old channels), where cottonwoods are damaged by elk browsing. Winter elk management would be expected to continue on private lands immediately north of the feedground, therefore impacts and resource condition trends would likely continue to reflect those that currently exist on this feedground. No measurable impacts to the wetland areas in the south end of the feedground from elk are expected.

Fall Creek: Winter elk management is expected to continue on Bureau of Land Management lands and State managed lands adjacent to (west of) the feedground; therefore riparian impacts due to animal use would continue, albeit at lower levels, due to the presence of hay nearby. This, in combination with continued road and dispersed recreation impacts, would lead to a continued downward trend in riparian area conditions. Potential impacts from winter elk management would continue along approximately 2,300 feet of Fall Creek channel within the Analysis Area, north of the Project Area. Impacts would decline moving upstream, with increasing distance from BLM land. No riparian vegetation occurs within the Project Area.

Fish Creek: Eliminating feed here would reduce cattle attraction, and elk and cattle-related impacts, along the Gros Ventre River. Potential impacts would be eliminated along approximately 2.1 miles of channel within, and near, the boundary of the feedground.

Muddy Creek: Adverse impacts to Muddy Creek and its riparian area would be reduced if winter elk management ended. Potential impacts would be eliminated along approximately 2,540 feet of Muddy Creek channel within, and near, the boundary of the feedground. Six acres of riparian vegetation would improve in condition over time.

Patrol Cabin: In this alternative, no permit would be issued for a feedground on the National Forest at this location, so no additional impacts to stream channels or riparian vegetation would occur on National Forest lands.

Upper Green River: Impacts due to elk are combined with the effects of cattle grazing. If no winter elk management were permitted at this location stream bank stability would improve on the northern side of the river. Potential impacts from winter elk management would be eliminated along approximately 3,850 feet of channel between the two portions of the feedground.

2. Direct and Indirect Effects under Alternative 2 – No Change from Current Permitted Area

Alkali Creek: Elk would continue to congregate in the one area currently showing impacts. One acre of riparian vegetation would be affected.

Dog Creek: Winter elk management would not impair hydrologic or wetland function in the southern and central portion of the feedground. Cottonwoods on the north end of the feedground would continue to be damaged by browsing.

Fall Creek: Stream banks would be affected by animals (both cattle and elk). Bank stability would continue to degrade along Fall Creek as feeding continues to attract animals to this area. Riparian vegetation adjacent to the feedground would continue to be affected. Stream channel in Fall Creek would be affected for 2,300 feet.

Fish Creek: Impacts would occur on both sides of the Gros Ventre River and would include one mile of stream. The existing condition and trend of riparian and stream channel conditions would continue, with continued high streambank instability, exacerbated by ungulate trampling and river crossing (when frozen) by horse drawn feed wagons.

Muddy Creek: Stream channel stability would continue to decline as animals trample banks, and riparian shrubs would continue to decline in vigor. Six acres of riparian vegetation and 2,540 feet of stream channel would be affected.

Patrol Cabin expansion: In Alternative 2, no permit would be issued for a feedground on the National Forest at this location, so no additional impacts to stream channels or riparian vegetation would occur on NFS lands.

Upper Green River: Five acres of riparian vegetation would be affected. The banks of the Green River would be affected by feeding sleds crossing the river.

3. Direct and Indirect Effects under Alternative 3 – Proposed Action

Alkali Creek: Elk would continue to congregate in the one area currently showing impacts. One acre of riparian vegetation would be affected.

Dog Creek: Winter elk management would not impair hydrologic or wetland function in the southern and central portion of the feedground. Cottonwoods on the north end of the feedground would continue to be damaged by browsing.

Fall Creek: Stream bank stability would continue to degrade along Fall Creek as feeding continues to attract animals to this area. Riparian vegetation adjacent to the feedground would continue to be affected. Stream channel in Fall Creek would be affected for 2,300 feet. The mitigation measure avoiding feeding within 200 feet of channels would reduce the potential for adverse effects under Alternative 3 but would

not totally eliminate impacts. This would lead to reduced attraction of animals near the stream and reduced impacts to Fall Creek for 1,000 feet of channel.

Fish Creek: Feeding operations would be limited to the west side of the creek in Alternative 3 and would include two miles of stream. No river crossing by horse drawn feed wagons would occur in Alternative 3. WGFC would avoid feeding within 200 feet of perennial streams. This measure would reduce the potential intensity of the impacts due to reduced attraction of animals to the stream. The existing condition and trend of riparian and stream channel conditions would continue, with continued high streambank instability, exacerbated by ungulate trampling.

Muddy Creek: Stream channel stability would continue to decline as animals trample banks, and riparian shrubs would continue to decline in vigor. Six acres of riparian vegetation and 2,540 feet of stream channel would be affected. The mitigation measure of avoiding feeding within 200 feet of channels would reduce the potential for adverse effects under Alternative 3, but would not totally eliminate impacts. The addition on one acre within this feedground under Alternative 3 would not affect hydrologic resources.

Patrol Cabin expansion: Under Alternative 3, winter elk management would take place in the Coal Mine Draw and Yellow Jacket Flat areas. Direct impacts to the channel in Coal Mine Draw would occur under Alternative 3, especially where there are existing headcuts. Direct and indirect impacts would also occur to riparian areas in the Yellow Jacket Flat areas. Because the channel in this area is not perennial, the mitigation measure addressing channel protection would not apply and channel trampling would occur with the additional attractant of feed. Three acres of riparian vegetation and 1,600 feet of stream channel would be affected under Alternative 3.

Upper Green River: Five acres of riparian vegetation would be affected. The banks of the Green River would be affected by feeding sleds crossing the river. Mitigation measure #5 of avoiding feeding within 200 feet of perennial stream banks would reduce the potential for adverse effects from trampling under Alternative 3, but would not totally eliminate trampling impacts. Mitigation measure #6 requiring identification of specific locations for stream crossings would also protect streambanks and riparian vegetation. Feeding sleds do not cross the river when it is not frozen.

4. Cumulative Effects

Management actions that could contribute cumulative effects related to hydrology resources for the Winter Elk Management Program Special Use Permit Proposal were considered within the Analysis Area – the area within 1 mile of each feedground. Past, present, and reasonably foreseeable management actions that could trample riparian vegetation, damage streambanks, affect channel function, and affect water quality include livestock grazing, vehicular use on road, off road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping. Off road vehicle use and cross country foot travel related to antler hunting in May and June is another action that affects hydrology and riparian resources within the area within and adjacent to feedgrounds. One planned future project, enhancement of wetlands north

of the Fish Creek feedground could also result in cumulative effects. This wetland enhancement project is designed to improve elk forage and swan habitat. Forage improvement in this area would lead to elk congregation, resulting in continued trampling and browsing impacts in the feedground, especially in the northern portion closest to the enhancement area.

Table 9 displays data about the management actions and resources considered for watershed cumulative effects by Alternative.

Table 9. Information Related to Watershed Resources Considered in the Cumulative Effects Analysis

Acres of NFS lands within the Project Area	**0 Acres Alt 1**	
	437 Acres Alt 2	
	573 acres Alt 3	
Authorized Feedgrounds within Active Grazing Allotments or Forage Reserves	**Alkali Creek, Fall Creek, Muddy Creek, Patrol Cabin, Upper Green River Lakes**	
Acres of Riparian Vegetation within the Project Area	**0 Acres Alt 1**	
	140 Acres Alt 2	
	152 acres Alt 3	
Acres by Vegetation Type Within the Analysis Area	**211 Acres**	**Cottonwood**
	788 Acres	**Grassland/Forbland**
	304 Acres	**Riparian Herbland**
	1,391 Acres	**Willow**
Distance of Stream Channel Potentially Affected	**4.3 Miles**	
Acres of NFS lands within the Analysis Area	**19,509 Acres**	
Acres of Active Grazing Allotments within the Analysis Area	**15,603 Acres**	
Miles of Roads within the Analysis Area	**69.1 Miles**	
Miles of Trail within the Analysis Area	**15.6 Miles**	

Although off road motorized use is presently allowed in portions of the Analysis Area, actual use is light. The BTNF is presently developing a travel management plan that will restrict all motorized use to a designated road and trail system. This expected future action would reduce the potential for riparian area impacts from off road use. The limited amount of use on open roads and trails that would continue after the Travel Plan is approved is not expected to contribute to cumulative effects for watershed resources in the Project Area or Analysis Area.

The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to hydrology or riparian resources.

Fisheries

Information provided in this EIS about fisheries is excerpted from The Fisheries Report for the Wyoming Game and Fish Commission Winter Elk Management Activity-Non-Recreation Special Use Permit Renewal by David Fogle and Joseph Neal, November 2007. The full text of this report is incorporated by reference.

A. Issues to be Addressed

Issue #3. Use of the feedgrounds concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures. Alternatives are compared in this analysis by considering the existing condition of stream banks within and adjacent to the feedgrounds, then comparing the extent of stream banks potentially affected by the alternatives.

B. Existing Condition

The elk feedgrounds are located in two major drainages that contain different species of native cutthroat trout. Both river basins have cutthroat trout species that are classified as game species and Species of Concern with the Wyoming Game and Fish Department, Management Indicator Species (Ecological) for riparian habitat in the *1990 Bridger-Teton National Forest Land and Resource Management Plan*, and Sensitive Species for the Intermountain Region of the Forest Service.

Alkali Creek, Dog Creek, Fish Creek, and Patrol Cabin feedgrounds are in the Upper Snake River drainage of the Columbia River and contain Snake River fine-spotted cutthroat trout (SRC). SRC are found throughout much of their original range in the Snake River portion of the Analysis Area (Van Kirk and Benjamin 2001). Muddy Creek, Fall Creek, and Upper Green River feedgrounds are in the Upper Green River drainage of the Colorado River system and are within the historic range of Colorado River cutthroat trout (CRT). CRT are limited in the Project Area streams from competition with non-native salmonids and habitat loss from water diversions. The streams within these feedgrounds contain primarily brook, brown, and rainbow trout. The Green River Basin also supports four endangered fish species, none of which are potentially impacted by the proposed special use permit.

Alkali Creek, Fish Creek, and Patrol Cabin feedgrounds are located in the upper Gros Ventre River basin. The Gros Ventre River is generally stable but lacks suitable stream substrate for good trout reproduction (WGFD 2004). Dog Creek Feedground is located in the Snake River – Fall Creek basin. This feedground is located near the confluence of the Snake River and Dog Creek. Flows in the Snake River are regulated by Jackson Lake Dam and Dog Creek is free flowing. The Snake River and Dog

Creek have relatively stable and healthy riparian vegetation but the fishery is limited by reduced winter flows from Jackson Lake Dam and tributaries with gradients too high for good trout reproduction (WGFD 2004).

The Fall Creek, Muddy Creek and Upper Green River feedgrounds are located in the upper Green River basin. The Upper Green River Feedground is on the Green River and is impacted by dispersed recreation year around (camping, hunting, fishing, hiking, snowmobiling, etc.) as well as livestock grazing and timber harvest. Fall Creek Feedground is located on Fall Creek below Burnt Lake. The feedground is located on BLM, WGFC, and USFS lands. Feeding occurs only on NFS lands and impacts are due to the concentration of elk. Fall Creek is also impacted by dispersed recreation. The section of stream between the feedground and Burnt Lake is denuded of vegetation and the soil resources are affected by dispersed camping use. The Muddy Creek Feedground is located on Muddy Creek just inside the Bridger-Teton National Forest boundary. Access is through private land and the gate into the feedground is closed and often locked. Primary impacts to this area are livestock use and hunters during the fall season (reopening closed roads and driving off-road).

C. Effects of the Alternatives

1. Direct and Indirect Effects of Taking No Action (Alternative 1 – No Special Use Authorization)

Streams within and adjacent to the feedgrounds are generally frozen and are in low flow condition during the time winter elk management takes place. Timing (late winter) and conditions (snow cover) limit impacts to the fishery from stream bank and in-stream disturbance at most feedground locations in the Snake River drainage. Feeding takes place away from the river and streams at Dog Creek (Snake River) and Alkali Creek and does not have direct effects to the fishery. Fish Creek and Patrol Cabin feedgrounds are located near the Gros Ventre River and Fish Creek but no direct effects to stream channels have been observed in Stream Habitat Inventories (BTNF 2003).

At two feedgrounds in the Green River drainage (Muddy Creek, and Upper Green River feedgrounds) winter elk management is conducted on both sides of the flowing water. Crossing the streams with hay wagons and congregating the elk on the stream banks does create bank damage. Bank damage affects fish habitat by reducing vegetative cover, and adding sediment to the water which may increase stream temperature and affect fish reproduction. Closing the Muddy Creek and Upper Green River feedgrounds would have measurable positive effects on individual fish or fish populations in the Green River drainage.

Trails created by animals moving into and out of the feedgrounds provide a source of sediment to enter streams during the snow free times of the year, which would impact fish reproduction down stream from the feedgrounds. Elk also browse on willow and cottonwood vegetation and have impacted the age composition favoring mature plants and reducing regeneration. Stream Habitat Inventory for the Gros Ventre River at Patrol Cabin feedground indicates a higher rate of willow browsing inside the feedground than up or downstream. Steam bank vegetation benefits fish by providing

shade that reduces water temperature. Discontinuing feeding in Fish Creek Feedground along the Gros Ventre River would improve riparian conditions and therefore improve fish habitat.

Winter elk management operations are expected to continue on private and BLM lands adjacent to Fall Creek and on state lands at Patrol Cabin. Effects on fishery resources on NFS lands near these two feedgrounds would continue under Alternative 1, affecting 0.64 miles of stream.

2. Direct and Indirect Effects of Alternative 2 – No Change in Permitted Area

Under Alternative 2, there are no direct effects on fisheries due to continuing winter elk management at Alkali Creek, Dog Creek, and Fish Creek feedgrounds. See "Direct Effects of Alternative 1" above.

Continuing winter elk management would have measurable direct effects on fisheries in the Green River drainage. Operations at Fall Creek, Upper Green River, and Muddy Creek feedgrounds would negatively affect individual fish or fish populations due to stream bank damage caused elk crossing the streams repeatedly and hay wagons crossing the stream at Muddy Creek and Upper Green River feedground.

Indirect effects of trails created by animals moving into and out of the feedgrounds would provide a source for sediment to enter streams during the snow free times of the year that would impact fish reproduction down stream from all of the feedgrounds. Elk also browse on willow and cottonwood vegetation and have impacted the age composition favoring mature plants and reducing regeneration along streams. In Alternative 2, a total of 2.85 miles of stream channel would be potentially affected.

3. Direct and Indirect Effects of Alternative 3 – Proposed Action

Under Alternatives 3, there are no direct effects on fisheries due to winter elk management at Alkali Creek, Dog Creek, Fish Creek, and Patrol Cabin feedgrounds. See "Direct Effects of Alternative 1" above. Expanding the feedgrounds on Fish Creek and Patrol Cabin feedgrounds would have no measurable direct effects on fish populations.

Continuing winter elk management would have measurable direct effects on fisheries in the Green River drainage. Operations at Fall Creek, Upper Green River, and Muddy Creek feedgrounds would negatively affect individual fish or fish populations due to stream bank damage caused by hay wagons and elk crossing the streams repeatedly. Implementation of Mitigation Measure #6 (Identifying specific crossing locations) reduces but does not eliminate this impact. Under Alternative 3, expanding the area of feeding on Muddy Creek Feedground will not have a measurable direct effect on fish populations.

Indirect effects of trails created by animals moving into and out of the feedgrounds would provide a source for sediment to enter streams during the snow free times of the year that would impact fish reproduction down stream from all seven of the feedgrounds. Elk also browse on willow and cottonwood vegetation and have

impacted the age composition favoring mature plants and reducing regeneration along streams. These impacts would continue under Alternatives 2 and 3. In Alternative 3, a total of 4.26 miles of stream channel would be potentially affected.

4. Cumulative Effects

The potential for cumulative effects related to fisheries resources for the Winter Elk Management Activites Special Use Permit Proposal was considered within the Analysis Area – the area including and within 1 mile of each feedground. Past, present, and reasonably foreseeable management actions that could affect fishery resources in the Analysis Area include livestock grazing, vehicular use on roads, off road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping. Off road vehicle use and cross country foot travel related to antler hunting in May and June is another action that affects fishery resources within the area within and adjacent to feedgrounds. Please refer to the Cumulative Effects text in the Vegetation and Hydrology sections of this report for discussion of effects to riparian vegetation and stream health.

Within the Analysis Area, soil disturbance and riparian vegetation damage are also caused by livestock grazing, roads, recreation trails, off road vehicle use, and natural landslides. Four of the seven feedgrounds (Fall Creek, Fish Creek, Patrol Cabin, and Upper Green River) are within active grazing allotments and are affected by livestock grazing/browsing/trampling in addition to elk grazing/browsing/trampling. Effects of sediment entering streams, stream bank damage, and riparian vegetation reduction that could be negatively affecting fish habitat in the vicinity of feedgrounds are compounded by the presence of livestock.

As mentioned in “Existing Conditions”, the Upper Green River Feedground is also impacted by dispersed recreation year around (camping, hunting, fishing, hiking, snowmobiling, etc.), as well as firewood gathering and timber harvest nearby. Fall Creek feedground is impacted by campers on the forest in the summer and fall. The section of stream between the feedground and Burnt Lake is denuded of vegetation and the soil has been affected. Cumulative impacts to Muddy Creek Feedground include hunter-use during the fall season (reopening closed roads and driving off-road).

The operations proposed in Alternative 2 have been ongoing for over 50 years and no cumulative impacts to fisheries have resulted. The small amount of additional impact described in Alternative 3 is not expected to result in any additional cumulative impact.

The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to fishery resources.

Wildlife

A. Issue to be Addressed

Issue #4. Use of the feedgrounds could impact elk, wolves, and wildlife species that utilize sagebrush and riparian habitat. Alternatives are compared in this analysis by a narrative describing the expected displacement and habitat changes by alternative.

B. Existing Conditions

Management Indicator Species

Management Indicator Species (MIS) are those species whose population changes are believed to reflect the effects of land management activities. Four types of MIS are identified in the *1990 Bridger Teton National Forest Land and Resource Management Plan*; harvested species, ecological indicator species, Forest Service sensitive species, and federally listed threatened and endangered species. Twenty-three MIS occur on the BTNF; seven mammals, four birds, three fish, two amphibians, and seven plant species.

The Project Area considered for this analysis includes the area proposed to be permitted for the feedgrounds. Environmental effects for some wildlife species are also described within the Analysis Area, which extends up to 1 mile from the feedgrounds. Only those wildlife species present or suspected in the Analysis Area will be carried further in the analysis (Table 10). The wildlife species that are not present or do not have habitat in the Analysis Area would not be impacted by this project and are not further discussed.

For population and habitat status for MIS across the Forest, refer to the BTNF MIS Report (2007) located in the project record.

Table 10. Wildlife MIS on the Bridger-Teton National Forest.

Common Name	Scientific Name	MIS type	Species Presence
Mammals			
Grizzly Bear*	***Ursus arctos horribilus***	**Sensitive**	**Known**
Elk	***Cervus elaphus nelsoni***	**Harvest**	**Known**
Mule deer	***Odocoileus hemionus***	**Harvest**	**Known**
Moose	***Alces alces shirasi***	**Harvest**	**Known**
Bighorn sheep	***Ovis canadensis***	**Harvest/Ecologica**	**Known**

	canadensis	**l**	
Pronghorn antelope	***Antilocarpa americana***	**Harvest**	**Known**
Pine marten	***Martes Americana origins***	**Ecological**	**Not Suspected**
Birds			
Bald eagle*	***Haliaeetus leucocephalus***	**Sensitive**	**Known**
Peregrine falcon*	***Falco peregrinus anatum***	**Sensitive**	**Not Suspected**
Whooping crane	***Grus americana***	**T&E**	**Not Suspected**
Brewer's sparrow	***Spizella breweri***	**Ecological**	**Suspected**
Amphibian			
Boreal toad	***Bufo boreas***	**Ecological**	**Suspected**
Boreal chorus frog	***Pseudacris triseriata maculate***	**Ecological**	**Suspected**

*The grizzly bear, bald eagle, and peregrine falcon have been removed from the T&E Species list since they were designated as MIS on the BTNF. They are now managed as Sensitive Species. Refer to the Sensitive Species Section for further information.

Harvest MIS

Elk: Elk are habitat generalists. During the summer, they spend the majority of their time in alpine and subalpine habitats. During the winter, elk movements are restricted by forage availability and snow conditions. Elk migrate to lower elevations where snow depth is shallow, and typically inhabit coniferous forests interspersed with riparian areas as well as south-facing slopes with sagebrush and other shrubs and aspen forests. The majority of the elk in the affected herd units migrate to feedgrounds in the winter, depending on the severity of the weather. See Appendix 1 for historical data concerning feedground attendance.

The Analysis Area is located within four elk herd units (102-Jackson, 103-Fall Creek, 107-Green River, and 108-Pinedale). The population trend for the Jackson and Fall Creek herds has been above average with the Jackson Herd at a population estimate of 12,777 elk in 2006 and an objective of 11,029. The Fall Creek Herd had an estimated 2006 elk population of 5,528 elk with an objective of 4,400 elk.

The Green River and Pinedale elk herds have had stable population trends. The Green River herd had an estimated 2006 population of 2,567 elk with an objective of 2,500 elk. The Pinedale Herd had an estimated 2006 population of 1,953 elk with an objective of 1,900 elk. See Appendix I for WGFD feedground data for 1975/76-2006/07.

Mule Deer: Mule deer are habitat generalists. They are often associated with early-successional vegetation and use rocky and brushy areas, open meadows, open forests, and recent burns. In the winter when snow pack becomes deep, mule deer migrate to lower elevations. The Analysis Area includes about 5,000 acres of mule deer winter range, of which about 4,000 acres is critical winter range (WGFC database). The Analysis Area is located within one mule deer herd unit (104- Sublette). The mule deer population trend for this herd has been relatively stable, but is currently below management objectives. This herd had an estimated 2006 population of 26,474 deer with an objective of 32,000 deer.

Moose: Moose use a variety of habitats from dense coniferous, deciduous, or mixed forests to shrublands, open meadows, grasslands, and riparian areas. Moose typically move to lower elevation willow dominated riparian areas in the winter. The Analysis Area includes about 18,000 acres of moose winter range, of which about 5,000 acres is critical winter range (WGFC database). The Analysis Area is located within two moose herd units (103- Jackson, 105- Sublette). The Jackson moose population trend has been downward with an estimated 2006 population of 1,785 moose with an objective of 3,600 moose. The Sublette moose population has been trending slightly downward with an estimated 2006 population of 4,066 moose and an objective of 5,500 moose.

Pronghorn Antelope: Pronghorn utilize sagebrush and grasslands in Wyoming. They are typically found in wide open areas where their vision is unrestricted.

Only a small portion of the lower elevation habitat on the BTNF is considered suitable for antelope. The majority of the suitable habitat for antelope in the Analysis Area is in the Gros Ventre watershed (Alkali Creek, Fish Creek, and Patrol Cabin feedgrounds). There is no winter range for pronghorn antelope within the Analysis Area (WGFC database). The Analysis Area is located within one pronghorn herd unit (401- Sublette). The population trend for this herd has been upward with an estimated 2006 population of 60,100 antelope and an objective of 48,000 antelope.

Bighorn Sheep: Bighorn sheep are found in a variety of habitats from alpine mountain meadows to desert grasslands. Sheep typically prefer high elevation alpine habitats with steep escape terrain adjacent to open foraging areas. Summer ranges are primarily at higher elevations in sub-alpine habitats, whereas winter ranges are generally at lower elevations, where precipitation is low, in areas dominated by sagebrush and grassland.

The Analysis Area is located within three bighorn sheep herd units (106- Targhee, 107- Jackson, and 609- Whiskey Mountain). Currently population trend information for the Targhee herd is unavailable due to lack of data. Only a very small portion of the Analysis Area (Dog Creek) is within this herd unit.

The Jackson herd has been trending downward with an estimated 2006 population of 388 sheep and an objective of 500 sheep. The Whiskey Mountain herd has been trending downward with an estimated 2006 population of 583 sheep and an objective of 1,350 sheep.

There is about 3,100 acres of bighorn sheep winter range in the Analysis Area, of which approximately 700 acres is critical winter range. This winter range is within 1 mile of the Alkali Creek Feedground.

Ecological MIS

Brewer's Sparrow: The Brewer's Sparrow is an ecological indicator for sagebrush habitat and is a sagebrush-obligate, which is restricted to sagebrush habitats during the breeding season and perhaps year-round. They are likely a common summer resident where suitable sagebrush habitat is present in the Analysis Area.

Six of the seven feedgrounds are located in sagebrush habitats. About 5,452 acres of sagebrush/mixed shrub habitat is located within 1 mile (Analysis Area indirectly influenced by winter elk management) of these feedgrounds (See Vegetation Section.) Little to no sagebrush occurs within the existing winter elk management areas.

The Rocky Mountain Bird Observatory (RMBO) recently completed breeding bird surveys from 2002 to 2006 on the BTNF. During these 5 years of surveys, the RMBO observed a total of 369 sparrows along 22 survey routes. These surveys included Bureau of Land Management land adjacent to the BTNF along the "Piney Front".

A total of five North American Breeding Bird Survey routes occur on the BTNF. Species occurrence data collected from 1968 to 2003 was analyzed at the route level to determine species trend per route. Four of the routes showed a positive trend during this period (+3.3, +18.1, +8.8, and +29.1 percent increase in the number on each route). One route showed a negative trend of -16.2 percent/year (BBS GIS data). Transect data was not collected for every route during every year of the survey period and these surveys were not specifically targeting sagebrush habitat. Depending on the route, the number of years that survey data was collected ranges from 8 to 21 years. Regionally in Wyoming, Brewer's sparrow population trends have been relatively stable with a -0.9 percent decrease in the occurrence of Brewer's sparrows on survey routes from 1968-2005 (USGS 2007).

Boreal Toad and Boreal Chorus Frog: The boreal toad and boreal chorus frog are ecological indicator species for wetland habitat. The boreal toad is a Wyoming species of special concern.

The boreal toad occupies montane forest habitats between 7,500 and 12,000 feet and requires breeding ponds, summer range, and winter refugia at various stages of its life history. It inhabits marshes, wet meadows, and the margins of streams, beaver ponds, and glacial ponds.

The boreal chorus frog is found throughout Wyoming and across the BTNF. This frog inhabits non-flowing bodies of water such as marshes, ponds, and small lakes in all life zones, from lower elevation to alpine areas above timberline. They are rarely found far from permanent water.

Potentially suitable habitat for the boreal toad/chorus frog exists in riparian areas in and adjacent to the feedgrounds.

Threatened, Endangered, and Experimental Species MIS

This section identifies the existing condition of threatened, endangered, and experimental species within the Analysis Area. A detailed Biological Assessment for federally listed threatened and endangered species is located in the project record. T&E species that are found on the BTNF and are known or suspected to occur within the area of influence of the Analysis Area are shown in Table 11.

Table 11. Threatened, Endangered, and Experimental Species Known or Suspected to Occur Within the Area of Influence of the Analysis Area.

Species	Federal Status	Species Presence
Canada Lynx (*Lynx canadensis*)	**Threatened**	**Known**

Canada Lynx: Canada lynx inhabit high elevation areas where deep snow gives them competitive advantage over other predators. Mature or late-successional spruce-fir forests provide foraging habitat for lynx in the southern portion of their range. These forests can support snowshoe hares (*Lepus americanus*), the primary prey species for lynx, as well as red squirrels, an important alternate prey species. Lynx habitat is closely associated with the habitat requirements of the snowshoe hare.

The Analysis Area is located within five Lynx Analysis Units (Fall Creek South, Upper Gros Ventre North, Roaring Fork West, Pole Creek, Muddy Creek South), but the Analysis Area does not contain any lynx habitat.

Sensitive Species MIS

This section identifies the existing condition for sensitive species within the Analysis Area. The Biological Evaluation for sensitive species is incorporated into this document. The fish and wildlife species listed in Table 12 have been designated as Sensitive by the Intermountain Region of the Forest Service and may occur within the Analysis Area. Suitable habitat exists in the Analysis Area for these species. No sensitive plants are known or suspected to occur in the Project Area.

Table 12. Intermountain Region Sensitive Fish and Wildlife Species Known or Suspected to Occur Within the Area of Influence of the Analysis Area.

Species	Species Presence
Grizzly bear (*Ursus arctos horribilis*)	**Known**
Gray wolf (Canis lupus)	**Known**
Greater sage grouse (*Centrocercus urophsianus*)	**Known**

Bald Eagle (*Haliaetus leucocephalus*)	**Known**
Cutthroat trout* (*Oncorhynchus clarki*)	**Known**
Columbia spotted frog (*Rana pretiosa*)	**Suspected**

* Two subspecies of cutthroat trout occur in the Analysis Area; Colorado River and Snake River fine-spotted cutthroat trout.

Grizzly Bear: Grizzly bears require cover for thermal, resting, and security cover. Optimum habitat consists of large areas with diverse vegetation communities, free from human disturbance. Grizzly bears are opportunistic feeders and will prey or scavenge on most available food, including ground squirrels, ungulates, carrion, and fish. In areas or times where high protein food sources are not available, grizzlies rely on the stems, leaves, roots, tubers, and bulbs of grasses and forbs, the berries of shrubs, and the cambium and pine nuts of conifers. Availability of specialized food sources such as whitebark pine stands, fish spawning streams, and ungulate winter ranges are seasonally important. Den sites are usually far away from human activity in mountainous terrain over 6,000 feet in elevation on steep slopes when deep snow accumulates.

The Analysis Area lies within the Greater Yellowstone Area (GYA). The GYA currently provides habitat for one of the five remaining populations of grizzly bears in the contiguous United States. Grizzly bears in this region were listed as Threatened under the ESA in 1975 and were de-listed in 2007.

Habitat for grizzly bears is present throughout the BTNF, with optimum habitat in the wilderness areas. Grizzly bears inhabit the Buffalo Ranger District and portions of the Jackson and Pinedale Ranger Districts. This species is known to occur in the Analysis Area in the Gros Ventre and Upper Green River areas. Although bears are present, the Analysis Area is outside of the Primary Conservation Area (PCA).

Gray Wolf: Gray wolves are native to the BTNF and were extirpated by humans by the late 1920's. Wolves were reintroduced in Yellowstone in 1995-96. Populations became established within two years after reintroduction and have been increasing since the initial reintroduction. The total wolf population in Wyoming increased from 252 wolves in 2005 to 311 wolves in 2006. Wolf numbers outside of Yellowstone National Park increased from 134 wolves in 2005 to 175 wolves consisting of 23 packs in 2006 (USFWS et. al. 2007).

On March 28, 2008, wolves were officially removed from the Endangered Species List in the Northern Rocky Mountains. This includes the entire states of Wyoming, Montana, and Idaho, as well as portions of Utah, Oregon, and Washington. Management authority for wolves in Wyoming, Montana, and Idaho now rests with the individual states. However, a number of groups have filed a 60-day notice of intent to file a lawsuit challenging the delisting of wolves in the Northern Rocky

Mountains, and it is possible that state management authority for wolves could be changed as a result of a lawsuit. On the BTNF wolves are now considered a Sensitive Species.

Abundant prey species consisting of elk, moose, and mule deer are found in the Analysis Area during various times of the year with elk being the primary prey species for wolves in the region. Multiple wolf packs and individual wolves are known to inhabit the Analysis Area during the winter months when elk are present, especially the Gros Ventre area.

Under direction from the WGFC's Wyoming Gray Wolf Management Plan (document incorporated by reference) wolves are classified as trophy game in northwestern Wyoming and predatory animals in the remainder of the state. The WGFD will manage wolves in the northwestern portion of the State to maintain 15 breeding pairs and 150 wolves with 7 breeding pairs occupying areas outside the National Parks and Parkway. Elk feedgrounds analyzed in this FEIS are present in both management areas. The Alkali Creek, Fall Creek, Fish Creek, Patrol Cabin and Upper Green feedgrounds are within the wolf trophy management area, while Dog Creek and Muddy Creek feedgrounds are located within the wolf predatory management area. Figure 46 displays the feedgrounds and their relationship to the wolf management areas. Details concerning Gray Wolf management can be found in the WGFC Wyoming Gray Wolf Management Plan, located at http://gf.state.wy.us/downloads/pdf/WolfFinal2007WyomingGrayWolfManagementPlan.pdf.

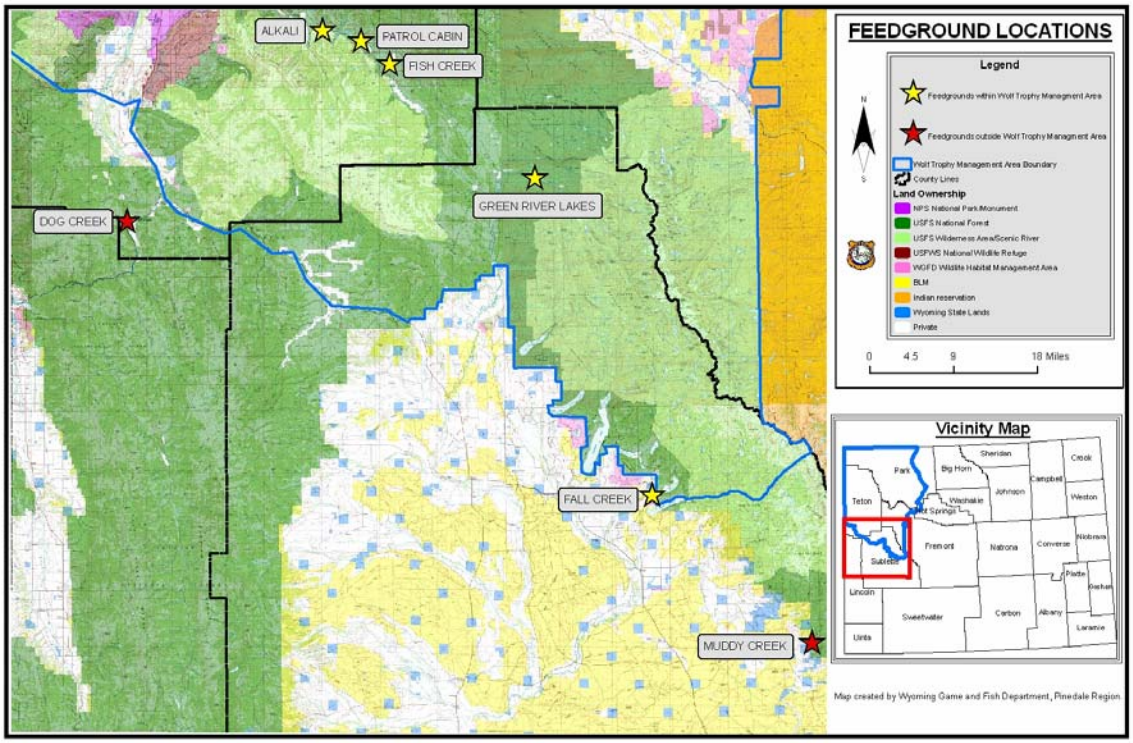

Figure 45. Feedground Locations Relative to Wolf Management Areas

Greater Sage Grouse: The greater sage grouse is an upland bird that is entirely dependent upon sagebrush communities for all stages of its life cycle. Sage grouse have high fidelity to their seasonal habitats (breeding, late brood-rearing, and wintering habitats), and females commonly return to the same areas to nest each year. Seasonally important habitats include dense stands of sagebrush and riparian meadows.

The Analysis Area provides potential brood rearing habitat in the Gros Ventre watershed (Alkali Creek, Fish Creek and Patrol Cabin feedgrounds) and Upper Green River areas. One lek site, located in the Gros Ventre, is about 2 miles from the Patrol Cabin Feedground and about 3 miles from the Fish Creek Feedground. There are no lek sites in the Upper Green river area.

Bald Eagle: Bald eagles are closely associated with water, and their nest sites are commonly found less than 1 mile from a lakeshore or riverbank. Large trees are necessary to support eagle nests. Alternate nests are commonly found within, or in close proximity to, the stand containing the nest. Old-growth stands, with their structural diversity and open canopies provide important habitat for eagles because snags and open-canopied trees located near the nest site and foraging areas offer favorable perches. Bald eagles with access to open water or alternate food sources

near their nesting territories may not migrate in winter; however, many eagles migrate southward to areas with available prey.

Two active eagle nests are located within close proximity of the Project Area. The Dog Creek nest is about one mile from the Dog Creek Feedground and the Upper Slide Lake nest is about one mile from the Patrol Cabin Feedground.

Cutthroat trout: See Fisheries section.

Columbia spotted frog: Columbia spotted frogs are found in areas where permanent, quiet water is present, such as marshy edges of ponds or lakes, algae-grown overflow pools of streams, or springs. Emergent and submergent vegetation and willows are considered important habitat features. Following the spring breeding season they may move considerable distances from water, often frequenting mixed conifer and subalpine forests, grasslands, and sagebrush if puddles, seeps, or other water is available. Potentially suitable habitat exists within the Project Area, especially in riparian areas.

Neotropical Migratory Birds

Neotropical migratory birds (NTMB) use a variety of habitats in the Analysis Area during the breeding season, including riparian, aspen, and sagebrush habitats.

Priority species for Wyoming have been identified in the Wyoming Bird Conservation Plan (Nicholoff 2003). Many of these birds are known to use habitats within the Analysis Area. Population trends for priority species have been estimated from the North American Breeding Bird Survey results and are available on the USGS Patuxent Wildlife Research Center website. Level I and Level II priority species in this plan are considered for this analysis and are defined as follows:

Level I: Priority bird species clearly needing conservation action. Declining population trend and/or habitat loss may be significant. This includes species which Wyoming has a high percentage of and responsibility for, the breeding population. Monitoring and the need for additional knowledge through research into basic natural history, distribution, etc. are necessary.

Level II: The action and focus for these species is monitoring. Declining population trends and habitat loss are not known to be significant at this point. Level II includes species which Wyoming has a high percentage of, and responsibility for, the breeding population. It also included species whose stability may be unknown, and species that are peripheral for breeding in the habitat or state, or for which additional knowledge may be needed.

Of the habitat types described in the Wyoming Bird Conservation Plan (Nicholoff 2003), five are considered the highest priority for Wyoming, including montane riparian, plains/basin riparian, short grass prairie, mid-elevation conifer and shrub-steppe. The short grass prairie type is essentially absent in the Project Area. Therefore, this habitat type and its associated birds are not further discussed. The Project Area only contains a negligible amount of mid-elevation conifer habitat, therefore this habitat type and its associated birds are not further discussed. Shrub-steppe habitat is present in the Project Area and is addressed under the greater sage-

grouse and Brewer's sparrow. Potential impacts to other NTMBs associated with this habitat type would be similar to those described for these species. Riparian areas (including willow habitat) make up a small amount of the Project Area. However, because riparian areas appear to be inordinately important to, and commonly used by, NTMBs, the area of analysis for NTMBs is montane riparian habitat in the Analysis Area. The plains/basin riparian habitat type occurs at elevations generally lower than those in the Project Area, and is not further discussed.

Montane riparian areas provide habitat for numerous NTMBs. These areas are typically dominated by willows, alder, dogwood, Rocky Mountain maple, and water birch, and can include narrowleaf cottonwood, spruce, and sedges and rushes at mid- to upper-elevations (Nicholoff 2003). The diversity of structure and cover provides nesting habitat, hiding and thermal cover, and food (insects, seeds and vegetation) for a variety of bird species. The water bodies provide a source of free water and food for aerial insectivores. Nine Level I and II priority bird species are associated with montane riparian areas, including the Calliope hummingbird, broad-tailed hummingbird, willow flycatcher, Hammond's flycatcher, American dipper, MacGillivray's warbler, Wilson's warbler, bald eagle, and harlequin duck.

Montane riparian habitat is limited in the Analysis Area, occurring primarily along the Upper Green River, Gros Ventre River, Fall Creek, Muddy Creek, Dog Creek, and their main tributaries, and the habitat has been influenced by past and current winter elk management practices. There are about 818 acres of willow habitat within 1 mile of the feedgrounds.

C. Effects of the Alternatives

Effects on Harvested Management Indicator Species

Harvested MIS species include elk, mule deer, moose, bighorn sheep, and pronghorn.

1. Direct and Indirect Effects Common to All Alternatives

Elk: Winter Elk Management Activities performed by the WGFC include feeding elk, which increases the winter survival rate. Feeding is expected to continue under all Alternatives, although in Alternative 1- No Action, activities would no longer occur on NFS lands in the Project Area.

The artificial concentration of elk during winter and early spring perpetuates the disease brucellosis, caused by the bacterium *Brucella abortus* (Thorne et al. 1978). Transmission of *Brucella* typically occurs orally when cattle and/or elk come into contact with infected aborted fetuses, fetal membranes and fluids, or uterine discharges (Thorne et al. 1982, Cheville et al. 1998). Brucellosis seroprevalence of elk on feedgrounds averages 25 percent, while brucellosis seroprevalence in elk from herd units adjacent to feedgrounds varies from 0 to 22%. Elk completely independent of feedgrounds have no prevalence of the disease (WGFD 2007). Brucellosis infections in cattle can impact Wyoming's Brucellosis Free status, resulting in increased testing requirements and potential trade sanctions on Wyoming's cattle producers. A major role of elk feedgrounds today is to reduce the commingling of elk and cattle for concerns over elk-to-cattle brucellosis transmission. Thus, elk

feedgrounds maintain the disease in elk while limiting elk-to-cattle transmissions at the same time. For further details see Appendix 2, "Elk Feedgrounds in Wyoming" (WGFD 2004).

Various disease management efforts are implemented on elk feedgrounds during winter. *Brucella* strain 19 vaccination of calves is conducted annually. Vaccination occurs in late January to March and is typically conducted by the feeder. Only calves are vaccinated and typically 100% of the calves on the feedground are inoculated.

The WGFD also monitors the distribution and prevalence of brucellosis on 4-6 feedgrounds a year during winter. Permanent elk traps exist on Upper Green River, Alkali, Fish Creek, and Muddy Creek feedgrounds. Elk are trapped until a sufficient sample size for 85% confidence level for brucellosis exposure rate is reached. Since 2006 Muddy Creek Feedground has been used to initiate a pilot test and removal program recommended by the Wyoming Brucellosis Coordination Team. The program involves trapping large numbers of elk and removing sero-positive elk from the population. In the winter of 2007-2008 at Muddy Creek Feedground, 357 elk were trapped, 154 female elk were tested, 21 elk tested sero-positive for brucellosis, 18 elk were transported to slaughter, and one trapping-mortality was incurred during two trapping events. The small number of elk that are removed in this program does not directly or indirectly affect the overall elk population dynamics or viability.

The elk-to-elk brucellosis exposure rate would not change under any alternative because elk would continue to be fed and artificially concentrated during the brucellosis transmission period. In all alternatives, the WGFC continues to feed elk on federal or other managed lands and maintain elk population numbers according to their management plans. Brucellosis-induced abortions would likely continue and calf production would be reduced by up to 5%. (Oldemeyer, Robbins, and Smith 1993, as adjusted for lower seroprevalence in recent years). This translates to a small loss in elk numbers overall, as adults do not generally die from brucellosis (Dobson and Meagher 1996), and the herd has a high intrinsic potential to increase (Lubow and Smith 2004). No impacts on the distribution of elk on the BTNF are expected as the result of brucellosis under any alternative.

Brucellosis can cause lameness in chronically infected adult elk and may increase winter deaths of a small percentage of infected elk through predation or starvation (Thorne et al. 1982). Few, if any adult elk deaths related to brucellosis would be expected, and impacts on adult mortality would be negligible.

No direct impacts on elk mortality, production, and recruitment are expected under any alternative as a result of lungworm infection. Necrotic stomatitis is not a transmissible disease. Thus, transmission between elk would not occur under any alternative.

Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy presumably caused by a proteinase-resistant isoform (PrP^{CWD}) of the prion protein (a normal cellular sialoglycoprotein; Spraker et al., 2002). The known natural hosts for CWD are North American cervids: mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), Rocky Mountain elk (*Cervus elaphus nelsoni*) and

moose (*Alces alces*; Williams et al., 2002; Kreeger et al., 2006). Disease can be induced in other species through intracerebral inoculation of PrP^{CWD} (Sigurdson et al., 2008), but these data do not imply that such species are naturally susceptible to CWD. It is unlikely that CWD can be transmitted to humans (Kong et al., 2005) or domestic livestock (Kreeger et al., unpubl. data). Chronic wasting disease is considered invariably fatal to the natural hosts, but this has not been proven under conditions of natural exposure.

Although PrP^{CWD} has been found in skeletal (Angers et al., 2006) and heart (Jewell et al., 2006) muscles, saliva, blood (Mathiason et al., 2006), and feces (Safar et al., 2008), it is unknown how PrP^{CWD} is naturally transmitted from an infected host to a susceptible animal. Artificial transmission has been achieved through oral (Sigurdson et al., 1999) or intracerebral (Williams and Young, 1992) inoculation using brain suspension from CWD-infected cervids.

Prevalence of CWD in free ranging populations can be as high as 45% in white-tailed deer (Edmunds, unpubl. data), 40% in mule deer, and 12% in elk (Kreeger, unpubl. data). Slightly higher prevalence has been observed in captive cervids (Peters et al., 2000). Mathematical models have implied that such high prevalence would result in noticeable population declines (Gross and Miller 2001). However, model predictions of CWD leading to declining abundance, or even local extinction, have not occurred anywhere in free-ranging cervid populations (Peterson, 2005). This could be due to inadequacies of the model (Schauber and Woolf 2003; Peterson, 2005).

The model of Gross and Miller (2005), combined with high prevalence both in captive and wild populations, have led to concerns that when CWD is found in elk frequenting state and federal feedgrounds in Wyoming that this would inevitably result in catastrophic population declines. At this time, there are no empirical data to support this conclusion. Conversely, preliminary evidence in captive elk suggests that elk can maintain very high prevalence of CWD without a concomitant population decline if allowed to reproduce (Kreeger, unpubl. data).

Peterson (2005) suggested that "preventing CWD from becoming established in the Greater Yellowstone Area is a far better option than dealing with it once it is there," yet goes on to say that "options for managing CWD once it exists in free-roaming cervid populations are practically nonexistent." Chronic wasting disease is well-established in Wyoming and Colorado, having existed there for at least three decades. In these states, as well as in Wisconsin and Saskatchewan, all management strategies to stop the spread CWD have failed. Therefore, it is probable that CWD will be found in elk in northwestern Wyoming at some point in time and there appears little that wildlife management agencies can do to prevent this.

However, management strategies possibly can be employed to slow the spread of CWD, such as reducing prevalence to reduce transmission (Gross and Miller, 2001). Although prevalence has been reduced by culling free-ranging populations in some areas (e.g., Colorado), it has failed in others (e.g., Wisconsin; Stuiber et al., 2006). Even if culling was practical and effective in reducing prevalence, it would not prevent the migration of infected cervids which would establish the disease in new

areas. Infected white-tailed deer have been observed to travel over 100 miles (Edmunds, unpubl. data), thus rendering any "buffer zone" strategy ineffective.

Chronic wasting disease may be best represented as an epizootic with a protracted time-scale (Miller et al., 2000) and it is probable that it will spread throughout Wyoming. Management strategies to prevent its spread are limited or non-existent. Management actions that appear to be somewhat effective in slowing the spread of CWD include: 1) reducing/eliminating CWD from the captive cervid industry to prevent inadvertent movement of the disease into new areas; 2) surveillance of hunter-killed cervids to discover new areas of infection; and 3) cervid population reduction in new CWD areas to prevent establishment of the disease. The WGFC has adopted a plan for management of CWD, which is attached as Appendix 3.

There are currently no empirical data to support the contention that CWD in elk utilizing winter feedgrounds will result in catastrophic, or even observable, population declines.

The potential effect of CWD on elk populations is similar for all alternatives in this analysis because the WGFC will continue to feed elk on Federal lands or other locations on State or private lands as near to the current site(s) as possible.

Other Harvest MIS: mule deer, moose, bighorn sheep, and pronghorn: Brucellosis may be transmitted to other ungulates, but aside from bison, these species are most likely dead end hosts (Davis 1990; Thorne 2001). Brucellosis is not expected to directly adversely impact populations of these species (Thorne et al.1982; Disease Expert Meeting 2002), and these species are not expected to transmit the disease to other species or conspecifics. Although bighorn sheep (BHS) are susceptible to brucellosis, elk to BHS transmission events are likely very rare (Kreeger et al. 2004). Some evidence suggests the BHS might not survive the disease (Kreeger et al. 2004) and therefore BHS to BHS transmission would be unlikely. Bison and elk do not interact on the feedgrounds studied in this analysis. Therefore, under all alternatives, no direct impacts to these species would occur as a result of brucellosis transmission from elk managed at these feedgrounds. Similarly, transmission of other diseases, including pasteurellosis, necrotic stomatitis, psoroptic scabies, lungworm, and viral microparasites are not expected from elk to other ungulates in any alternative.

Chronic wasting disease, if it became established, could affect moose to some degree, but moose social behavior reduces its potential to contract the disease. Bighorn sheep and pronghorn would not be directly impacted under any of the alternatives because they do not seem to be susceptible (Williams, Kirkwood, and Miller 2001). Mule deer are susceptible to chronic wasting disease, which is always fatal (Williams and Miller 2002). It is possible that a high prevalence of chronic wasting disease in elk could result in increased transmission from elk to mule deer and/or increased environmental contamination, which could potentially increase the prevalence in mule deer. Further details about CWD are found in the WGFC's Chronic Wasting Disease Management Plan located in Appendix 3.

2. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

Elk: If winter elk management were discontinued at Alkali Creek, Fish Creek, Muddy Creek, and Upper Green River feedgrounds, elk would likely migrate to other nearby feedgrounds in winter, or the WGFC would establish alternative winter elk management locations off of USFS lands. Although winter elk management would be curtailed on NFS lands in Alternative 1, it is expected to continue to occur near Dog Creek, Fall Creek, and Patrol Cabin feedgrounds on lands adjacent to the BTNF. Because elk would continue to be fed somewhere, elk population numbers and health are not expected to be affected by closure of feedgrounds on NFS lands.

Although the elk-to-elk brucellosis exposure rate does not vary by alternative, the potential for elk-to-cattle brucellosis exposure does vary. In Alternative 1, the projection is that WGFC would relocate the Muddy Creek and Upper Green River Feedgrounds on private or other land outside the BTNF boundary. If the new location is near private land that supports a livestock operation, elk-to-cattle brucellosis exposure potential would be higher than described in Alternatives 2 and 3.

Concerning CWD, because all alternatives in this analysis project that WGFC would continue to feed elk on other federal, State, or private lands, the potential exposure and infection rate of CWD is common to all alternatives. However, current research on captive elk indicates that the captive environment may become contaminated with the CWD prion. In the No Action Alternative, no permits are issued at the seven locations studied in this analysis; therefore the NFS lands would be less likely to become contaminated with these prions.

Other Harvest MIS: The very small amount of habitat in the Project Area and Analysis Area used by mule deer, bighorn sheep, and pronghorn antelope would be expected to improve over time. No direct or indirect effects are anticipated for these species by this improvement due to the very small amount of habitat suitable for Harvest MIS that is affected by this Alternative.

3. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area

Continuing winter elk management operations at the existing locations (Alternative 2) would result in no direct effects to Harvest MIS since there is very little competition for forage or space between Harvest MIS in the Analysis Area.

Habitat conditions for Harvest MIS would remain in a degraded condition in the Project Areas. All habitat effects are at a very small scale compared to the available habitat in the surrounding area.

For moose, willow habitats in and adjacent to feedgrounds would continue to be degraded, primarily due to browsing/trampling of willows by elk. As stated earlier, these effects would be at a very local scale compared to the available willow habitat adjacent to the Project Area.

Indirect effects to bighorn sheep (BHS) are not expected. Even though the Alkali Creek Feedground is within WGFC delineated BHS winter range, BHS have never

been observed to use the Project Area. Competition for forage and space is not expected.

For the remaining Harvest MIS, no measurable indirect effects are anticipated due to the very small amount of habitat in the Analysis Area compared to the available habitat in the surrounding area.

The potential for elk-to-cattle brucellosis transmission would be low because elk would be held on the BTNF, reducing intermingling with most private land livestock operations.

If CWD can be transmitted through prions in the feedground environment, the six feedgrounds permitted in this alternative located on NFS lands could become a reservoir for infection if CWD arrives in elk populations in NW Wyoming.

4. Direct and Indirect Effects of Alternative 3 – Proposed Action

Expanding the feedgrounds (Alternative 3) would result in no direct effects to Harvest MIS since there is very little competition for forage or space between Harvest MIS in the Analysis Area.

Habitat conditions for Harvest MIS would remain in a degraded condition in the Project Areas. The proposed action would slightly increase the impacts to habitat on two feedgrounds, Patrol Cabin (+88 acres) and Fish Creek (+ 47 acres). All habitat effects are at a very small scale compared to the available habitat in the surrounding area.

For moose, willow habitats in and adjacent to feedgrounds would continue to be degraded, primarily due to browsing/trampling of willows by elk. As stated earlier, these effects would be at a very local scale compared to the available willow habitat adjacent to the Project Area.

Indirect effects to bighorn sheep (BHS) are not expected. Even though the Alkali Creek Feedground is within WGFC delineated BHS winter range, BHS have never been observed to use the winter elk management area. Competition for forage and space is not expected.

For the remaining Harvest MIS, no measurable indirect effects are anticipated due to the very small amount of habitat in the Analysis Area compared to the available habitat in the surrounding area.

The potential for elk-to-cattle brucellosis transmission would be low in Alternative 3 because elk would be held on the BTNF, reducing intermingling with most private land livestock operations. The potential for elk-to-elk brucellosis transmission and other disease transmission would be slightly lower than Alternative 1 and 2 because the Fish Creek and Patrol Cabin Feedgrounds are larger in Alternative 3, reducing concentration of elk. See the Elk-Cattle Separation discussion beginning on page 18 of Appendix 2, Elk Feedgrounds in Wyoming.

If CWD can be transmitted through prions in the feedground environment, the seven feedgrounds permitted in this alternative located on NFS lands could become a reservoir for infection if CWD arrives in elk populations in NW Wyoming.

Effects on Ecological Management Indicator Species

Ecological MIS species include Brewer's sparrow, boreal toad, and boreal chorus frog.

1. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

Habitat conditions in the Analysis Area would be expected to improve over time for all Ecological Indicator Species. This alternative would relocate most direct or indirect effects for Ecological Indicator Species to private, state, or other federal land.

2. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area and Alternative 3 – Proposed Action

No direct effects to Ecological Indicator Species are anticipated since this project occurs in the winter when boreal toads/chorus frogs are dormant and winter elk management occurs outside of the Brewer's sparrows breeding season.

Indirectly, winter elk management affects habitat for Brewer's sparrow, boreal toad, and boreal chorus frog. In Alternative 2, sagebrush and riparian habitat in the Project Area (487 acres) and the Analysis Area (1 mile surrounding the feedgrounds) would continue to be degraded as described in the vegetation and hydrology sections of this report.

These feedgrounds are used during the winter when the ground is frozen which minimizes elk trampling impacts to riparian zones.

3. Direct and Indirect Effects of Alternative 3 – Proposed Action

No direct effects to Ecological Indicator Species are anticipated since this project occurs in the winter when boreal toads/chorus frogs are dormant and winter elk management occurs outside of the Brewer's sparrows breeding season.

Indirectly, winter elk management affects habitat for Brewer's sparrow, boreal toad, and boreal chorus frog. In Alternative 3, sagebrush and riparian habitat in the Project Area (573 acres) and the Analysis Area (1 mile surrounding the feedgrounds) would continue to be degraded as described in the vegetation and hydrology sections of this report. Effects are at a very local scale compared to the available habitat adjacent to the Analysis Area.

These feedgrounds are used during the winter when the ground is frozen which minimizes elk trampling impacts to riparian zones. Avoiding using wetland areas and the areas within 200 feet of perennial streams early and late in the winter elk management season (Mitigation Measures #4 and #5) and identifying specific stream crossing locations (Mitigation Measure #6) further minimizes potential indirect effects to boreal toad/chorus frog habitat.

Effects to Threatened, Endangered, and Experimental Species

This section discloses potential effects to the Canada Lynx the threatened, endangered, and experimental species potentially affected by this project. Potential

direct, indirect, and cumulative effects are described by alternative. Further analysis of effects to T&E, including effects determinations, conservation strategies, and recovery guidelines and goals, is included in the Biological Assessment located in the project record.

1. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

No direct effects to lynx are anticipated from not issuing a special use permit because winter elk management would continue to occur on federal or other managed lands.

Indirectly, summer habitat for potential prey species (hare, other small mammals) on-forest would improve over time at Alkali Creek, Fish Creek, Muddy Creek and Upper Green River feedgrounds. Habitat would not improve at the remaining feedgrounds because winter elk management would continue on adjacent private, state, or other federal land.

3. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area

No direct or indirect effects to lynx are anticipated from implementing Alternative 2. This is due to the low occurrence of lynx in the area and that no lynx habitat occurs in the project area.

4. Direct and Indirect Effects of Alternative 3 – Proposed Action

No direct or indirect effects to lynx are anticipated from implementing Alternative 3. This is due to the low occurrence of lynx in the area and that no lynx habitat occurs in the project area.

Effects to Sensitive Species

This section discloses potential effects to Sensitive Species. Potential direct and indirect effects are described by species, by alternative, and cumulative effects are summarized by species category. Effects to species by alternative may be combined where appropriate due to similar impacts or no impacts.

1. Direct and Indirect Effects of All Alternatives

Elk make up a portion of the prey base for grizzly bears, wolves, and bald eagles on the BTNF. If a new disease (e.g. bovine tuberculosis, bovine paratuberculosis, or chronic wasting disease) is introduced and reduces elk by a moderate or major amount, grizzly bears, wolves, and bald eagles could benefit in the short term due to a more vulnerable prey and more carcasses available for scavenging. In the long term, grizzly bear, wolves, and bald eagles could be negatively impacted due to a decrease in the numbers of available prey or carrion. The risk of this does not vary by alternative because all alternatives assume continued winter elk management by the WGFC on federal or other managed lands.

Grizzly bears, wolves, and bald eagles would not be impacted by contracting paratuberculosis, brucellosis, or chronic wasting disease under any of the alternatives because they are not known to be susceptible to these diseases (Williams 2001: Thorne et al. 1982).

2. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

The elimination of the 6 existing feedgrounds on NFS lands would not affect grizzly bears or bald eagles.

No direct effects to wolves are anticipated from not issuing a special use permit because winter elk management would continue to occur on federal or other managed lands. Regardless of the location of feedgrounds under Alternative 1, wolves would continue to be attracted to the concentration of elk at the feedgrounds as they are attracted to elk concentrations on native winter range. Indirectly, summer habitat for potential prey species (elk, deer, hare, other small mammals) on-forest would improve over time at Alkali Creek, Fish Creek, Muddy Creek and Upper Green River feedgrounds. Habitat would not improve at the remaining feedgrounds because winter elk management would continue on adjacent private, state, or other federal land. This leads to a determination of "may impact individuals or habitat but not likely to trend towards Federal listing or cause a loss of viability".

Sage grouse habitat would be improved by sagebrush recovery over time at Alkali Creek, Fish Creek, Muddy Creek and Upper Green River feedgrounds. Habitat would not improve at the remaining feedgrounds because winter elk management would continue on adjacent private, state, or other federal land. These effects result in a determination of "may impact individuals or habitat but not likely to trend towards Federal listing or cause a loss of viability" for greater sage grouse, cutthroat trout, and Columbia spotted frogs.

3. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area

Grizzly Bear: No direct or indirect effects are expected from implementing Alternative 2. This is due to the project taking place during the winter when bears are inactive. No den sites are located near these feedgrounds. Also, the feedground areas are roaded so they do not provide secure habitat for bears during the summer. This would limit the use of the Project Area by bears during the summer season. In the spring, bears may feed on carrion at the feedgrounds; however, this opportunity is inconsequential.

Grey Wolf: Wolves would continue to be attracted to the concentration of elk at the feedgrounds. Wolves would continue to be managed by the WGFD. Within the trophy management area, very limited hunting for wolves would take place. Within the predator area, unlimited hunting is allowed. Refer to the Wyoming Gray Wolf Management Plan for details concerning wolf management near feedgrounds. This leads to a determination of "may impact individuals or habitat but not likely to trend towards Federal listing or cause a loss of viability".

Greater Sage Grouse: No direct effects are expected from implementing Alternative 2 because winter elk management activities take place outside of the sage grouse breeding season and the feedgrounds are not known to provide winter habitat for sage grouse. Indirectly, sagebrush stands within 1 mile of the feedgrounds in the Gros Ventre would continue to be impacted by elk. These impacts are at a very local scale compared to the available habitat in the surrounding area. The lek site is outside of this zone so it would not be affected. See the Brewer's Sparrow Section for further analysis on impacts to sagebrush.

Bald Eagle: No direct or indirect effects are expected from implementing Alternative 2. For the most part, the project takes place outside of the bald eagle breeding season. Some elk feeding may take place in late winter/early spring which would overlap with the eagle breeding season, but the nearest feedgrounds are at least 1 mile from identified nest sites and are topographically screened or visually screened by vegetation. Eagles have successfully nested at these sites during the current winter elk management activities, thus, no impacts to nesting eagles are expected. If eagles are in the area in the winter/early spring they may feed on carrion at the feedgrounds; however, this opportunity is inconsequential.

Cutthroat Trout: See Fisheries section.

Columbia Spotted Frog: No direct effects are anticipated since this project occurs in the winter when Columbia spotted frogs are dormant and the ground is frozen which minimizes impacts to riparian soils and vegetation. Indirectly, elk contribute to detrimental soil disturbance near riparian areas in the Project Area which degrades habitat for Columbia spotted frogs. There are 140 acres of riparian vegetation habitat in Alternative 2 that would be potentially affected.

Effects determinations for sensitive species for Alternative 2 are summarized in Table 13.

Table 13. Effects Determinations for Implementing Alternative 2 or 3 for Intermountain Region Sensitive Fish and Wildlife Species Known or Suspected to Occur Within the Area of Influence of the Project Area.

Species	Determination*
Grizzly bear	**NI**
Gray Wolf	**MIIH**
Greater sage grouse	**MIIH**
Bald Eagle	**NI**
Colorado River Cutthroat trout	**MIIH**
Snake River Fine-Spotted Cutthroat	**NI**

Trout

Columbia spotted frog MIIH

* NI: No Impact
MIIH: May impact individuals or habitat but not likely to trend towards Federal listing or cause a loss of viability.

4. Direct and Indirect Effects of Alternative 3 – Proposed Action

The effects described for grizzly bear, gray wolf, greater sage grouse, and bald eagle in Alternative 2 are the same for Alternative 3. The small amount of additional land occupied by winter elk management activities in Alternative 3 does not create any additional effects.

Cutthroat Trout: See Fisheries section.

Columbia Spotted Frog: No direct effects are anticipated since this project occurs in the winter when Columbia spotted frogs are dormant and the ground is frozen which minimizes impacts to riparian soils and vegetation. Indirectly, elk contribute to detrimental soil disturbance near riparian areas in the Project Area which degrades habitat for Columbia spotted frogs. There are 149.5 acres of riparian vegetation habitat in Alternative 3 that would be potentially affected. In Alternative 3, mitigation measures minimize potential indirect effects. These include: avoiding using wetland areas and the areas within 200 feet of perennial streams early and late in the winter elk management season (Mitigation Measures #4 and #5) and identifying specific stream crossing locations (Mitigation Measure #6). Effects are at a very local scale compared to the available habitat adjacent to the analysis area.

Effects determinations for sensitive species for Alternative 3 are summarized in Table 13.

Effects to Neotropical Migratory Birds

1. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

No direct effects are expected from implementing Alternative 1. Indirectly, riparian habitat conditions for neotropical migrant birds in the Analysis Area would improve over time by closure of the Alkali Creek, Fish Creek, Muddy Creek, and Upper Green River feedgrounds. Winter elk management is expected to continue to occur at Dog Creek, Fall Creek, and Patrol Cabin feedgrounds on lands adjacent to the National Forest, resulting in continued effects to NTMB on NFS lands.

2. Direct and Indirect Effects of Alternative 2 – No Change from Current Permitted Area

No direct effects are expected from implementing Alternative 2 because the winter elk management activities take place outside of the migratory bird breeding season.

Indirectly, 1,091 acres of willow habitat within the Analysis Area would continue to be degraded. Elk browsing primarily affects willow habitat by reducing willow cover to less than 2 meters in height (Anderson 2007). This would continue to negatively affect the relative abundance of willow-associated species, especially Willow Flycatchers, MacGillivray's Warblers, and Fox Sparrows (Anderson 2007) in the Analysis Area. Indirect effects to willow-associated species are at a very local scale (individual birds) and likely would not impact watershed or regional bird populations.

3. Direct and Indirect Effects of Alternative 3 – Proposed Action

No direct effects are expected from implementing Alternative 3 because the winter elk management activities take place outside of the migratory bird breeding season.

Indirectly, 1,391 acres of willow habitat within the Analysis Area would continue to be degraded. Elk browsing primarily affects willow habitat by reducing willow cover to less than 2 meters in height (Anderson 2007). This would continue to negatively affect the relative abundance of willow-associated species, especially Willow Flycatchers, MacGillivray's Warblers, and Fox Sparrows (Anderson 2007) in the Analysis Area. Indirect effects to willow-associated species are at a very local scale (individual birds) and likely would not impact watershed or regional bird populations.

Cumulative Effects to Wildlife

The potential for cumulative effects related to elk were considered within the herd management units areas described by the WGFC. Alkali Creek, Fish Creek, and Patrol Cabin feedgrounds are located within the Jackson Elk Herd Unit. Dog Creek (Prichard) Feedground is located in the Fall Creek Elk Herd Unit. Upper Green River Feedground is located in the Upper Green River Elk Herd Unit. Muddy Creek and Fall Creek feedgrounds are located within the Pinedale Elk Herd Unit.

The WGFC's supplemental elk feeding activity is a cumulative action that is a daily activity during the winter months at 21 feedgrounds and one staging area. Although feedgrounds were initiated to maintain elk populations, they have become an effective tool in reducing damage to haystack yards and winter pastures on private lands (WGFD 2007). Elk feeding locations have been strategically placed to effectively gather elk as they transition from summer ranges down to lower elevations, mostly preventing elk migrating through private lands enroute to lower elevations. Figure 1 in Chapter 1 displays a map of the 21 WGFC managed feedgrounds, the staging area (North Piney) and the National Elk Refuge.

Other than elk, the potential for cumulative effects to wildlife habitat for the Winter Elk Management Activities Special Use Permit Proposal was considered within the Analysis Area – the area within 1 mile of each feedground. Wildlife habitat would be affected by the Winter Elk Management Activities Special Use Permit Proposal by impacts to sagebrush habitat and riparian habitat. The cumulative actions that also affect these habitats are displayed and described in the Cumulative Effects Section for Vegetation and Hydrology in this report, most notably livestock grazing, and to a

smaller extent fire, prescribed fire, and herbicide treatments. Please refer to those sections for detailed discussion.

The project activities take place during the winter when most wildlife species are inactive or have migrated out of the Analysis Area. No cumulative impacts are expected from the combination of elk related impacts with other impacts on wildlife that depend upon sagebrush and riparian habitats.

Elk, wolves, and carrion dependent wildlife would also be affected by the increased potential for disease transmission created by concentrating elk on feedgrounds during the winter. The seven feedgrounds considered in this analysis are part of a system of 21 WGFC managed feedgrounds, one staging area, and one federally managed feedground in northwest Wyoming, as displayed in Figure 1. Cumulative effects to elk populations as a result of winter elk management activities at all feedgrounds are discussed in the WGFC report "Elk Feedgrounds in Wyoming" in Appendix 2.

Other past, present, and reasonably foreseeable management actions that could affect wildlife resources in the Analysis Area include winter recreation and off road vehicle use and cross country foot travel related to antler hunting in May and June. The feedgrounds are in closed winter range where no motorized vehicles, and/or no human presence (depending on the area), are allowed. Where designated snowmobile trails pass by the feedgrounds, snowmobilers are required to stay on the trail, follow a speed limit, and cannot stop. Elk are habituated to recreation users who follow these rules and therefore they are not affected by this activity. No cumulative impacts are expected from the combination of winter stress and recreation stress on elk in the Project Area or Analysis Area.

The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to wildlife resources.

Cultural Resources

A Class III cultural resource survey was conducted at each feedground and reports detailing the results of these surveys have been submitted to the Wyoming State Historic Preservation Office. No historic properties were identified at any of the elk feedgrounds; however, historic properties have been identified adjacent to two of the feedgrounds. Historic properties, as defined in 36 CFR 800.16, which implements Section 106 of the National Historic Preservation Act, means any prehistoric or historic district, site, building, structure, of object included in, or eligible for inclusion in, the National Register of Historic Places.

Wilderness and Wilderness Study Areas

A. Issues to be Addressed

Issue #2. Use of the feedgrounds concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness qualities when feedgrounds are located near Wilderness and Wilderness Study Areas. Alternatives are compared in this analysis by a narrative describing the effects on wilderness character and by a comparison of acres of expected vegetation change under each alternative.

B. Existing Conditions

1964 Wilderness Act and 1984 Wyoming Wilderness Act

In 1964, Congress passed the Wilderness Act (PL 88-577), which designated the Bridger Wilderness. In 1984, Congress passed the Wyoming Wilderness Act (PL 98-550), which designated the Gros Ventre Wilderness and Palisades Wilderness Study Area and expanded the Bridger Wilderness. The purpose of the 1984 Wyoming Wilderness Act was to "designate certain National Forest System lands for inclusion in the National Wilderness Preservation System in order to preserve the wilderness character of the land and to protect watersheds and wildlife habitat, preserve scenic and historic resources, and promote scientific research, primitive recreation, solitude, physical and mental challenge, and inspiration for the benefit of all of the American people".

For Wilderness, Section 4(b) of the 1964 Wilderness Act provides the primary management direction stating that "… each agency administering any area designated as wilderness shall be responsible for *preserving the wilderness character* of the area" (emphasis added). Wilderness character is not defined in the legislation; however Congressional intent for the meaning of wilderness character is expressed in the Definition of Wilderness, Section 2(c) of the 1964 Wilderness Act (Rohlf and Honnold 1988, McCloskey 1999, Scott 2002). This definition reveals four inter-related qualities of Wilderness; Wilderness is a place that is, (1) untrammeled (i.e. essentially free from modern human control or manipulation), (2) undeveloped, (3) natural, and (4) provides outstanding opportunities for solitude or a primitive and unconfined type of recreation.

For Wilderness Study Areas (WSAs), the Wyoming Wilderness Act states that the Secretary of Agriculture "shall administer the area so as to maintain its *presently existing wilderness character* and *potential for inclusion* in the National Wilderness Preservation System (NWPS)" (emphasis added). Management of WSAs is not as restrictive as for Wilderness. Human activities that would not be allowed in designated Wilderness can occur in WSAs where the use pre-dated passage of the Wyoming Wilderness Act as long as the activity does not impair the area's potential for inclusion in the National Wilderness Preservation System and wilderness character is not degraded below what existed in 1984.

This section discloses the potential effects of alternative proposals for seven elk feedgrounds on the requirement to "preserve wilderness character" in designated Wilderness and on the requirement to maintain "presently existing wilderness character" and "potential for inclusion in the NWPS" for designated WSAs.

Current Conditions by Feedground

No elk feedground operations are authorized within Wilderness or within WSAs for any of the seven feedgrounds. However, vegetation located within one mile of feedground operations is indirectly impacted due to trampling and browsing from concentrated numbers of elk, thus wilderness character within these designated areas is affected. The presence of feedgrounds also attracts people searching for antler sheds in early May when winter restrictions on human activities are lifted. Where motor vehicles are used to search for antlers, intrusion into Wilderness occurs. Following is a brief description of existing conditions related to Wilderness and WSAs for the seven feedgrounds within this analysis:

Alkali Creek Feedground: This feedground is located on National Forest Lands immediately adjacent to the northern boundary of the Gros Ventre Wilderness. There are no WSAs located within one mile of this feedground. Approximately 1,292 acres of vegetation are currently indirectly affected within the Gros Ventre Wilderness (467 acres within DFC 6B and 825 acres within DFC 6C) due to concentrated elk trampling and browsing as a result of feeding operations directly adjacent to the Wilderness on the Alkali Feedground. This area is less than 1% of the total acreage in the Gros Ventre Wilderness (0.45%). This area is displayed in Figure 46. Wildlife species which depend upon these vegetative species may also be affected within this portion of the Wilderness as a result of the adjacent feedground activities. Motor vehicle intrusions into the Wilderness have been documented in early spring by antler shed hunters.

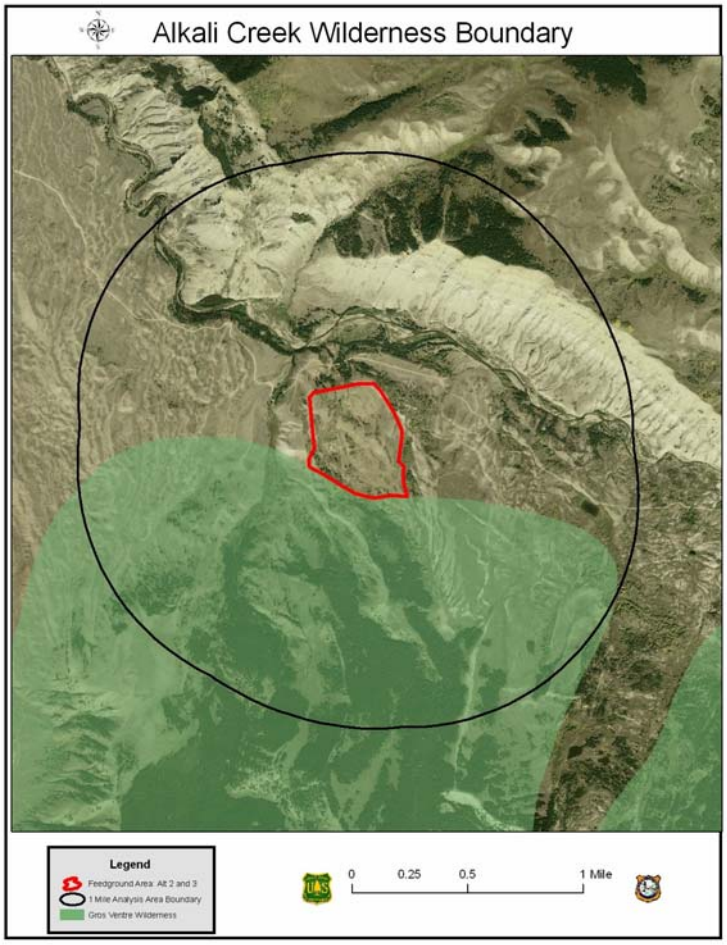

Figure 46. Area of vegetation within one mile of Alkali Creek Feedground in relation to Gros V.entre Wilderness

Dog Creek Feedground: This feedground is located on National Forest and private lands approximately ½ mile east of the Palisades WSA. An estimated 1,019 acres of vegetation are currently indirectly affected within the Palisades WSA due to concentrated elk trampling and browsing as a result of feeding operations associated with the Dog Creek Feedground. This is less than 1% of the total acreage in the WSA (0.75%). This area is displayed in Figure 47. Wildlife species which depend upon these vegetative species may also be affected within this portion of the WSA as a result of feedground activities. There is no designated Wilderness located within one mile of this feedground. Thus, there are no known direct, indirect, or cumulative effects to Wilderness from current winter elk management activities at this feedground.

Figure 47. Area of vegetation within one mile of Dog Creek Feedground in Relation to Palisades WSA

Fall Creek Feedground: This feedground is located approximately 3.5 miles south of the Bridger Wilderness. There are no WSAs located within or near this feedground. There are no known direct, indirect, or cumulative effects to Wilderness or WSAs from current winter elk management activities at this feedground.

Fish Creek Feedground: This feedground is located over 1 mile north of the Gros Ventre Wilderness. There are no WSAs located within or near this feedground. There are no known direct, indirect, or cumulative effects to Wilderness or WSAs from current winter elk management activities at this feedground.

Patrol Cabin Feedground: This feedground is currently located on State lands immediately adjacent to the National Forest on both sides of the Gros Ventre River, approximately ¼ mile north of the Gros Ventre Wilderness. Approximately 278 acres of vegetation within the Gros Ventre Wilderness (DFC 6B and 6D) are currently indirectly affected within the Gros Ventre Wilderness by concentrated elk within one mile of the Wilderness from this feedground. This is approximately 0.1% of the total acreage in the Gros Ventre Wilderness. This area is displayed in Figure 48. There are no WSA's

located within one mile of this feedground. There are no known direct, indirect, or cumulative effects to WSAs from current winter elk management activities at the feedground.

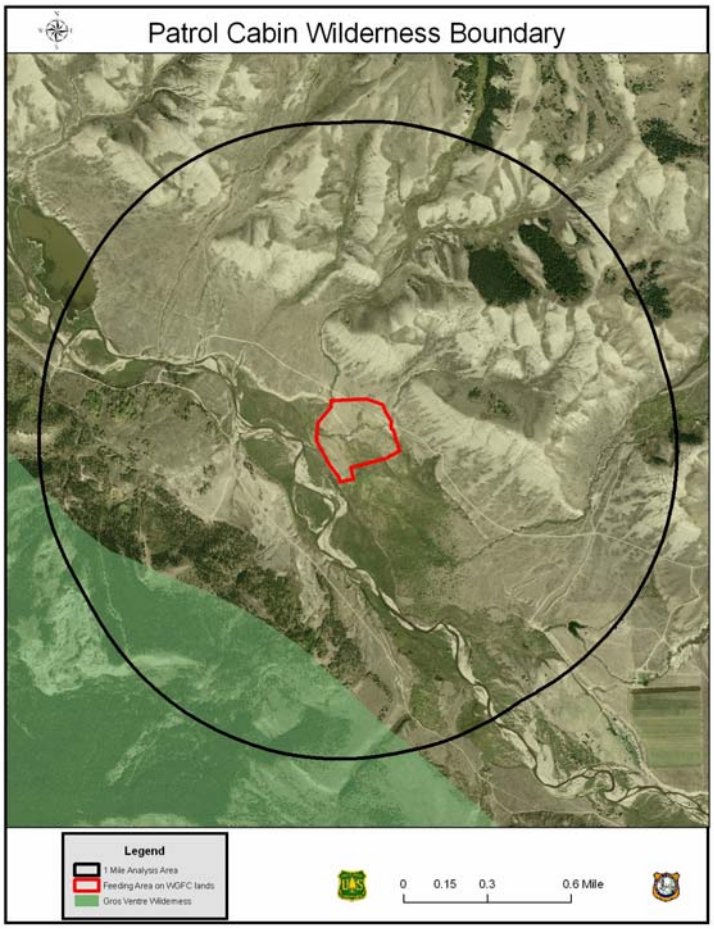

Figure 48. Area of vegetation within one mile of Patrol Cabin Feedground in relation to Gros Ventre Wilderness.

Muddy Creek Feedground: This feedground is located approximately 6 miles south of the Bridger Wilderness. There are no WSAs located on or near this site. There are no known direct, indirect, or cumulative effects to Wilderness or WSAs from current winter elk management activities at this feedground.

Upper Green River Feedground: This feedground is located approximately 3 miles west of the Bridger Wilderness. There are no WSAs (WSAs) located within or near this feedground. There are no known direct, indirect, or cumulative effects to Wilderness or WSAs from current winter elk management activities at this feedground.

D. Effects of the Alternatives

Since no feedground operations occur within Wilderness or WSAs, there are no direct effects on these designated areas. However, indirect effects from concentrated numbers of elk do occur within these designated areas. Vegetative changes are observed within one mile of feedgrounds. The vegetative changes resulting from concentrations of elk numbers above what would naturally occur without feedgrounds, impact the "untrammeled" and "natural" qualities of wilderness character. Vegetative impacts include trampling or browsing of plants and potential for the introduction and spread of invasive plants. The potential for motorized incursion into Wilderness by people searching for antler sheds impacts the "undeveloped" quality of wilderness (i.e. an area essentially without permanent improvement or modern human occupation).

1. Direct and Indirect Effects of Alternative 1 – No Action - No Special Use Authorization

Under this alternative, no Term Special Use Permits would be issued to the WGFC for any of the seven elk feedgrounds in this analysis. However, approximately 278 acres of vegetation within the Gros Ventre Wilderness (DFC 6B and 6D) would continue to be affected because the feeding operation at Patrol Cabin would continue on State land within one mile of the Gros Ventre Wilderness. Similarly, in the Dog Creek area, feedground operations would continue on private land adjacent to the National Forest, thus a small amount of area within the Palisades WSA would continue to be affected.

Over time, this alternative would improve the natural and untrammeled qualities of wilderness character on approximately 1,292 acres within the Gros Ventre Wilderness with the discontinuation of the Alkali Creek Feedground. Sagebrush and willow inside the Gros Ventre Wilderness within one mile of the Alkali Creek Feedground would be expected to return to natural conditions in 20 to 30 years, although affected aspen and cottonwood trees would take longer to recover.

If elk numbers remained at historic averages, no change to "*presently existing* wilderness character" would be expected within the Palisades WSA. Many of the present feedground locations started in the late 1940s and early 1950s, thus when the WSA was designated in 1984, feedground effects were already present. However, if elk numbers were to increase substantially on the private land near Dog Creek due to closure of the other feeding sites, increased impacts on vegetation could be expected within a small portion of the WSA. The presence of higher than natural elk numbers and vegetation changes would not affect the potential of the WSA for inclusion in the National Wilderness Preservation System.

2. Direct and Indirect Effects of Alternative 2 - No Action – No Change from Current Permitted Area

Feeding within one mile of the Gros Ventre Wilderness boundary at the Alkali Creek and Patrol Cabin feedgrounds would continue to result in concentrated elk numbers inside the Wilderness with subsequent vegetation changes. The severity of the effects would diminish gradually with increased distance from the feedground.

The human influenced concentration of elk affects the "untrammeled" quality of wilderness character. National Forest Wilderness Policy states that managers are to "provide an environment where the forces of natural selection and survival rather than human actions determine which and what numbers of wildlife species will exist". While higher numbers of elk would certainly be found within this localized area of the Wilderness, it is not likely that this feedground alone plays a central role in determining what number of elk exists within the Wilderness or within the Jackson area. Thus the effect on the "untrammeled" quality of wilderness is likely to be minimal.

With this alternative, the natural quality of Gros Ventre Wilderness character would continue to be impacted on approximately 1,292 acres within one mile of Alkali Creek Feedground and 278 acres within one mile of the Patrol Cabin Feedground. The degree of impact would be greater near the feedgrounds and would decrease with increasing distance from the feedgrounds.

Feeding near the Palisades WSA within one mile of Dog Creek Feedground would continue to concentrate elk inside this WSA, which will continue to affect the natural and untrammeled character on approximately 1,019 acres. However, as noted under Alternative 1, no change from "presently existing" wilderness character is anticipated since the feedground was established long before 1984. Additionally, the potential for inclusion in the NWPS would not be affected by continuing feedground operations at Dog Creek.

The concentration of elk and resulting soil disturbance from trampling carries the potential for introducing and spreading invasive weeds to the Gros Ventre Wilderness, Bridger Wilderness, or Palisades WSA from hay delivered and fed at the seven feedgrounds. This is particularly true for the Alkali Creek and Dog Creek feedgrounds due to their proximity to the Wilderness and WSA. The vegetation analysis noted that occurrence of noxious weeds on feedgrounds is currently minimal. By continuing to use certified weed-free hay and implementing effective monitoring and aggressive treatment programs, the potential for weed infestations would not be expected to be higher for feedgrounds compared with other sources of weed introduction.

The potential for motorized intrusions into designated areas is a particular concern at the Alkali feedground due to open country, poorly marked boundary, and proximity of the feedground to the Wilderness boundary. The nature of the terrain and further separation of the feedground from the designated area boundary limits the potential for motorized intrusions in other areas. This concern could be mitigated by improved boundary signing and cooperative enforcement patrols.

3. Direct and Indirect Effects of Alternative 3 - The Proposed Action

Similar to Alternative 2, approximately 1,292 acres of vegetation would continue to be impacted within the Gros Ventre Wilderness from Alkali Creek Feedground operations and approximately 278 acres of vegetation within the Gros Ventre Wilderness would continue to be indirectly affected as a result of feeding operations within one mile of the existing Patrol Cabin Feedground on state land adjacent to the Forest. Approximately 1, 019 acres of vegetation would continue to be impacted within the Palisades WSA from Dog Creek Feedground operations.

With this alternative, approximately 891 additional acres of vegetation would be impacted within the Gros Ventre Wilderness due to expansion of the Patrol Cabin Feedground into the Yellow Jacket Flat area, which is located within one mile of the Wilderness. This area is displayed in Figure 49. The Coal Mine Draw proposed addition to the Patrol Cabin Feedground in this alternative is greater than one mile from the Gros Ventre Wilderness so would not be expected to have adverse affects to vegetation and wildlife within the Wilderness.

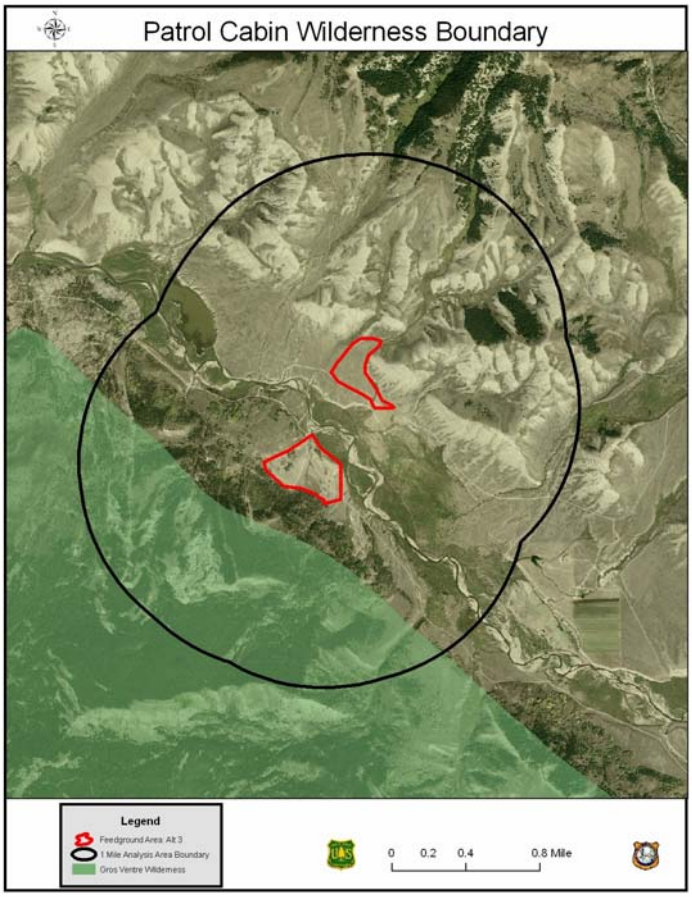

Figure 49. Area of vegetation affected by Yellow Jacket Flat and Coal Mine Draw proposed additions to Patrol Cabin Feedground in relation to Gros Ventre Wilderness

The effects of this alternative to the Bridger Wilderness and the Palisades WSA are the same as those described under Alternative 2. For the Gros Ventre Wilderness, Alternative 3 would result in new impacts to vegetation and soils, higher than natural elk numbers in a localized area, and would create more potential for motorized intrusions and introduction of invasive plants. While the potential for motorized intrusions and introduction of invasive plants could be mitigated, creating new impacts on vegetation and new impacts on the distribution and abundance of elk in the area would not be consistent with the requirement to "preserve wilderness character".

4. Cumulative Effects

Cumulative actions within the analysis area include day and overnight recreation use and cattle grazing. The cumulative actions of cattle and elk grazing on aspen and riparian vegetation and of recreation, livestock, and elk transporting and spreading invasive weeds is described in the Vegetation Section of this EIS. The combined effects of past, present, proposed and reasonably foreseeable actions in the analysis area, do not contribute any other cumulative effects to Wilderness and WSA resources.

Social and Economic

The social or economic effects are not expected to vary from implementation of the Proposed Action or any of the Alternatives. In all Alternatives, WGFC would continue to operate their winter elk management activities on private, state, and federal lands. Whether or not NFS lands are available, the program would continue with no expected change to the social or economic environment. Elk population numbers would not be affected by any actions described in the alternatives; therefore there would be no impacts to tourism or other wildlife related economies.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Continued use and expanded use of NFS lands for WGFC's winter elk management activities affects the long-term productivity of the riparian areas within the Project Area and in the portion of the Analysis Area immediately adjacent to the Project Area. As

described in previous sections, riparian areas support a variety of wildlife and fish populations.

Concentrating large numbers of elk on feedgrounds could affect the rate of spread of disease, such as CWD, if it were to become established in the Analysis Area. The decision to be made by the Forest Service under any of the alternatives would have no effect on whether or not CWD arrives in the Analysis Area, or the potential rate of spread of the disease, since feeding would continue with or without the use of NFS land.

Unavoidable Adverse Effects

Feedground practices on adjacent land near Dog Creek and Fall Creek Feedgrounds and on State land at Patrol Cabin Feedground would create unavoidable impacts on the National Forest in Alternative 1. Unavoidable impacts occur from use on the National Forest and from use on adjacent lands in Alternatives 2 and 3.

Detrimental soil disturbance would occur in all alternatives as a result of compaction and erosion caused by cross country travel by horses, machinery, and equipment and trampling by elk.

Vegetation species richness, diversity, and vigor would be affected in all alternatives.

Water quality would be affected by stream bank damage, erosion and sedimentation in all alternatives.

Wildlife would be affected by impacts to sagebrush, riparian, and aspen wildlife habitat in all alternatives.

Feedgrounds increase the probability of disease and parasite transmission among elk, including brucellosis, chronic wasting disease and other diseases.

These effects are discussed in detail throughout the document.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

Irreversible losses could occur in willow habitat within and adjacent to feedgrounds due to loss of root stock as continued heavy browsing by elk in the winters prevents suppressed willow plants in wet meadow habitat from recovering to a healthy condition. Irretrievable losses of aspen habitat could occur due to heavy browsing.

The potential exists for irretrievable commitments of both elk and deer resources if chronic wasting disease (CWD) became established in the Jackson Hole or Sublette

County areas and substantially reduces these populations. While the arrival of CWD is beyond the control of wildlife managers, the potential effect would be greater under any alternative where large numbers of animals are concentrated on feedgrounds. The loss would be irretrievable because in addition to always being fatal to infected animals, chronic wasting disease contaminates the environment for long periods of time. Soil on the feedgrounds could become a reservoir of CWD that would continue to infect animals many years into the future. This is considered an irretrievable loss (loss for a period of time) rather than an irreversible loss (can not ever be reversed) because it is not known how long contamination of the environment would persist. Decontamination methods on game farms and research facilities have been unsuccessful and animals introduced to these facilities years after a chronic wasting disease outbreak and depopulation have subsequently become infected.

The potential exists for irretrievable commitments of predator and scavenger resources to occur if CWD became established and substantially reduced the elk population. (*U. S. Fish and Wildlife Service and National Park Service Bison and Elk Management Plan and Environmental Impact Statement* (2007)).

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare EISs concurrently with and integrated with …other environmental review laws and executive orders."

- National Historic Preservation Act for causing ground disturbing actions in historical places: A cultural resource survey for each feedground has been reviewed by the Wyoming State Historic Preservation Office. A determination of no historic properties affected has been made for the winter elk management Activities and no further survey or mitigation is required.
- U.S. Fish and Wildlife Service in accordance with the ESA implementing regulations for projects with threatened or endangered species.