Chapter 3

Affected Environment

INTRODUCTION

This chapter provides information regarding existing and desired future conditions (DFC's) in the project area. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the proposed action or alternatives is described in this chapter by its current condition and uses. These descriptions of current conditions provide the basis for assessing the potential environmental effects of the alternatives (addressed in Chapter 4 of this document) and the context for assessing how each of the alternatives responds to the significant issues identified in Chapter 1.

This chapter describes the affected environment by individual resource. Most of the resources addressed in this chapter are directly related to the issues discussed in Chapter 1; however, additional resources identified during scoping as important to this project are also included in this section. The discussions of resources and existing conditions utilize existing information from the Bridger-Teton National Forest Land and Resource Management Plan (Forest Plan), project-specific resource reports prepared by natural resource specialists, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for this project includes all project-specific information, including the full text of resource reports and the results of field investigations. These records are available for public review.

WILDLIFE

The following discussions and analysis are based on past studies and applicable research. Additional direction for wildlife is also contained in Chapter 4 of the Forest Plan (pp. 123-127).

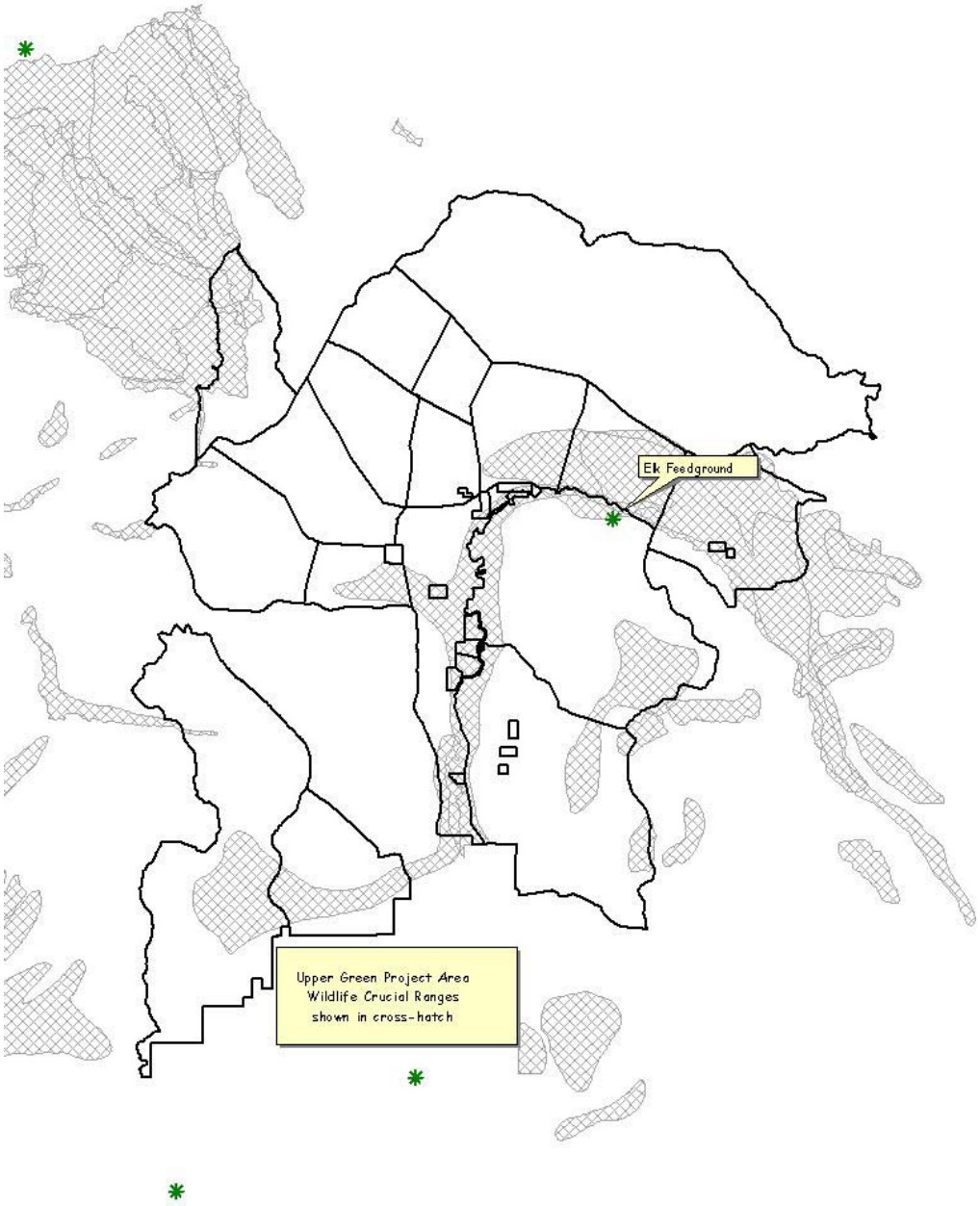
Desired Future Condition

Provide suitable and adequate habitat to support dependent wildlife populations and promote species diversity. Place special emphasis on threatened, endangered, and sensitive species. Management activities should enhance and not cause further declines in population numbers or habitat.

Existing Condition

The project area is home to many wildlife species, and approximately 20 percent of it is designated as crucial range for some type of wildlife. Approximately 18 percent of the project area is designated DFC 12. These areas are managed to provide high-quality wildlife and escape cover, big game hunting opportunities, and dispersed recreation opportunities. Small animals, such as rabbit, grouse, beaver, neotropical migrant birds, and coyote, are present in the project area, along with harvested animals, such as elk, deer, antelope, moose, mountain lion, and bear. The project area provides summer, winter, and parturition range for these species and contains important migration corridors between summer and winter ranges. One especially significant migration route for deer and antelope runs the west side of the Green River then along Bacon Ridge and Bacon Creek. Another important deer migration corridor runs through the Moose/Gypsum area. A number of Threatened, Endangered, and Sensitive (TES) species may also be found in the project area. TES species are addressed in a separate section of this chapter. Figure 3-1 shows the crucial wildlife range in the project area. Crucial range is a habitat or range component which is the determining factor in a population's ability to maintain and reproduce itself at a certain level (theoretically at or above the WGFD population objective) over the long term. **W**inter and parturition ranges for elk, deer, moose, antelope, and bighorn sheep are included in BTNF Forest Plan designated crucial ranges.

Figure 3-1
Wildlife Crucial Range in the Project Area



Wildlife use of this area is significant. One key element in meshing livestock use with wildlife use is to monitor ground cover and forage utilization levels carefully. Because most of the crucial wildlife use in these allotments is during fall, winter, and spring, enough forage and ground cover needs to be left once the cattle are removed in the fall so that ungulate use post growing season doesn't exceed guidelines.

Within riparian areas, vegetation structure and composition is important to maintain streams and stream bank/lake shore integrity. Although riparian communities are vital to a wide range of wildlife species, amphibians and trumpeter swan are focal species for this analysis.

Management Indicator Species

Some species found in the project area are designated as Management Indicator Species (MIS) in the Forest Plan (1990). MIS are species whose population changes are believed to reflect the effects of land management activities. MIS include harvested species, ecological indicator species, Forest Service Sensitive Species, and federally listed Threatened and Endangered species. The existing condition and habitats of harvested and ecological indicator wildlife species in the project area are described below. Threatened, Endangered, and Sensitive (TES) species and fisheries MIS are addressed separately in their respective sections of this chapter.

Neotropical migrant birds are also discussed as required by Executive Order 13186 (2001).

Harvested Species

Populations of most harvested species in the project area are currently near the objective levels established by the Wyoming Game and Fish Department (WGFD). Bighorn sheep and antelope populations are currently below WGFD objectives. Population objectives are established by utilizing a number of environmental and social factors, such as desired hunting opportunities, carrying capacity of native winter ranges, and feed ground objectives. Population objectives do not represent the “carrying capacity” of the land. Populations within 10 percent of the established objective (either higher or lower) are considered to be meeting objectives. Table 3-1 displays crucial range and population statistics for harvested MIS in the project area (WGFD 2001).

Table 3-1
Harvested MIS Species Crucial Range and Populations

Species	Crucial Winter Range in the Project Area	Parturition (Birthing) Grounds in the Project Area	Spring, Summer, Fall Range or Migration Route in the Project Area	2001 Herd Unit Population	WGFD Population Objective
Elk Green River Herd	10,928 acres	18,898 acres	Yes	2,650	2,500
Moose Sublette Herd	8,795 acres	8,795 acres	Yes	5,665	5,500
Bighorn Sheep Jackson Herd Whiskey Mtn. Herd	768 acres	768 acres	Yes	322 500	500 1,350
Mule Deer Sublette Herd	None	None	Yes	34,700	32,000
Antelope Sublette Herd	None	None	Yes	42,300*	48,000

*1997 data

Approximately 20 percent of the project area (roughly 33,210 acres) is designated as crucial range for the harvested species listed in the table above. As crucial ranges for different species often overlap each other, the figures displayed in the table will not add up to this total.

The direct effect of livestock grazing is competition for forage and space between livestock and wildlife. This competition is most obvious between elk and cattle. There are diet similarities between other large ungulates where competition could occur to some extent. Elk, deer, moose, antelope and bighorn sheep are all MIS species under the forest plan. All of these species utilize the area. Adverse impacts could include less quality and quantity of forage available for wildlife (both summer and winter) and displacement of wildlife by cattle and their associated riders and dogs.

Elk
National Forest System (NFS) lands within project area provide elk with spring, summer, fall, and winter habitat and serve as important travel corridors between summer and winter

ranges. Historically, some elk migrated off NFS lands to winter ranges in the desert to the west and south; however, these historic migration paths crossed private lands where livestock and hay production operations led to conflicts between elk and the livestock industry. The Green River Lake (GRL) feed ground was established on NFS lands in an effort to reduce conflicts by stopping elk before they reached private land. The feed ground is located along the Green River in the southwest ¼ of section 10, T39N, R109W.

The feed ground concentrates winter elk use and, thereby, increases the potential for transmission of disease among elk, overuse of nearby native ranges, and detrimental impacts to adjacent riparian areas. However, elk on the GRL feed ground have been vaccinated and tested for *Brucella abortus* antibodies for the last 13 winters as part of the ongoing WGFD Brucellosis Feedground Habitat Program. According to WGFD, brucellosis transmission from elk to cattle is not likely in this area, as there are no cattle present when elk are on the feed ground (WGFD, 1996).

Elk are fed an average of 123 days per winter (WGFD, 2000), and the number of elk utilizing the feed ground has remained fairly constant over several years. An average of 517 elk used the feed ground each year from the winter of 1975-76 to the winter of 2000-2001. These numbers are well below the WGFD Commission quota of 675 animals. A large number of elk in the area utilize native winter ranges; however, the number of elk observed on native winter ranges has been declining (WGFD 1999). A significant amount of their native range lies outside the boundaries of the project area on the lower slopes of Osborn Mountain, Clear Creek, and Mill Creek.

There is potential to improve native elk winter and transition ranges adjacent to the GRL feed ground both within and outside the project area complex. Although prescribed fire or other vegetation treatments may increase forage amounts and quality on winter ranges, it is difficult to predict if treatments would result in more animals “wintering out” and thus lessen elk use on the feed ground midwinter. Weather conditions (particularly snow depth) and human disturbance are often the overriding influence on elk movements during winter. Vegetation treatments, especially in sagebrush and aspen transition ranges, may result in elk leaving the feed ground earlier in the spring, however, thus expanding elk distribution,reducing the potential for disease transmission and negative habitat impacts on the feed ground. Potential transition range treatment areas include Pinyon Ridge, the Hogsback (Roaring Fork divide) and the foothills of Osborn Mountain (Little Elk Ridge located immediately south and east of Roaring Fork Creek).

Moose

Moose found within the project area are part of the Sublette moose herd unit. The Upper Green River area provides one of the most important moose winter ranges in this herd unit. WGFD was concerned that snowmachine and human use may be impacting moose usage of riparian areas. Moose population densities, both on and off National Forest System lands, have been monitored for the past 11 winters (WGFD, 2001). Winter Patrol efforts have been implemented for the last several winters to enforce moose winter range closures.

Bighorn sheep
The upper elevational reaches of the project area contain winter, spring, summer, and fall range for the Jackson and Whiskey Mountain bighorn sheep herds. These are Wyoming "core native herds." Bighorn sheep typically prefer high elevation alpine habitats with steep escape terrain adjacent to open foraging areas. They also prefer areas where human and domestic livestock activities are minimal. Direct bighorn sheep habitat overlap with cattle range is minimal in the project area.

Historically, bighorn sheep were found throughout the Wind River and Gros Ventre Ranges. Presently, bighorn sheep numbers in the western United States are estimated to be less than 10 percent of pre-settlement populations (Schommer and Woolever, 2001). At the present time the populations of these herds are below WGFD objective levels. The exact number of animals utilizing the project area in summer and winter is not known, as the area comprises only a small portion of the total herd unit.

In the winter of 2001/2002, 43 bighorn sheep mortalities were documented on low elevation winter ranges for the Jackson herd in the Gros Ventre and Miller Butte areas which are north of the allotment complex. WGFD estimates 40% mortality was experienced across the population, perhaps reaching as high as 60% in some locations (WGFD 2001). Both herds maybe below objective as a result of this die off.

Mule deer
The project area provides transition and summer range for a portion of the Sublette mule deer herd. Based on the Sublette Mule Deer Study (Sawyer and Lindsey 2001), this herd is likely the most migratory deer population in the United States. These deer typically summer in areas of rugged terrain between 7,500 and 10,000 feet in elevation that contain high quality grass and forb communities. They occupy summer ranges from late June through October and transition ranges in April, May, early June, November, and December. Transition range occurs between 7,000 and 8,000 feet in elevation and contains abundant grass and forbs, intermixed with mountain shrub communities. Female mule deer typically give birth on transition range.

The project area provides a crucial migration route for mule deer that links the Gros Ventre River area summer range with winter range on the Mesa and other areas to the south (toward Farson). Two deer migration routes of special concern lie in the project area. One is located in the Bacon Ridge/Bacon Creek area, and the other is in the Moose/Gypsum area.

Antelope
The project area provides spring, summer, and fall range for a limited number of antelope from the Sublette herd unit, which is the most migratory antelope population in the United States. The project area also provides a crucial migration route that links the Jackson Hole area summer range with winter range near the Mesa, and additional ranges to the south (near Farson). Specifically, these antelope utilize a route that runs along the west side of the Green River from the Forest boundary north to Bacon Ridge and Bacon Creek and continues into the Gros Ventre River drainage (Sawyer and Lindzey 1999).

Ecological Indicator Species

Ecological Indicator Species are restricted to specific habitats that meet important life requirements. The pine marten and Brewer's sparrow represent groups of species associated with key habitats that could be affected by land management activities.

Pine Marten (*Martes americana*)
Habitat: Old-growth Forest
Pine marten inhabit old-growth forests and are known to occur in the project area. Suitable habitat for pine marten is available in the project area and trapping records are available to estimate the size and extent of the population.

Pine marten are dependent on structural diversity associated with late successional or mature forest stands for denning, resting, foraging habitat, thermal and escape cover, as well as gaining access to subnivean sites for resting and foraging during winter. They have undergone major reductions in distribution in the western US. This is primarily due to reduction and fragmentation of habitat due to timber harvest (Buskirk and Ruggiero 1994).

Brewer's sparrow (*Spizella brewer*)
Habitat: Sagebrush
Brewer's sparrows inhabit sagebrush communities and are likely common summer residents of suitable habitat within the project area. Brewer's sparrows are neotropical migrants: they summer in North America and winter in Central or South America. Approximately 34,700 acres of the project area is composed of sage/grass type vegetation suitable for these birds. Nationwide, Brewer's sparrow populations are in decline. Declines are due to fragmentation and removal of sagebrush habitat (Nicholoff 2003).

Brewer's sparrow is a sagebrush obligate, so is restricted to sagebrush habitats during the breeding season and perhaps year-round. They build cup nests of grass, rootlets, and forbs, low in a live sagebrush shrub or on the ground at the base of a live sagebrush. They are a common cowbird host and parasitized nests are occasionally deserted. They feed on insects and seeds gleaned from the ground (Nicholoff 2003).

Brewer's sparrow is a Level 1 priority species for Wyoming. See definition below.

Neotropical Migrant Birds

Executive Order (EO) 13186, signed January 10, 2001, lists several responsibilities of federal agencies to protect migratory birds. Additional direction comes from the Memorandum of Understanding (MOU) between USDA Forest Service and USDI Fish and Wildlife Service, signed January 17, 2001.

Neotropical migratory birds (NTMB) use a variety of habitats on all allotments during the breeding season when cattle are present. A list of NTMB with suitable nesting habitat in the allotments is present in the project file. Priority species identified in the Wyoming Bird

Conservation Plan (Nicholoff 2003)[1] are listed in Species Priority Table, this may be found in the planning record. Level I and Level II priority species have been considered for this analysis and are defined as follows:

- Level 1 priority bird species are those that clearly need conservation action. Declining population trend and/or habitat loss may be significant. This includes species of 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.
- 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 of which Wyoming has a high percentage of and responsibility for the breeding population, species whose stability may be unknown, species that are peripheral for breeding in the habitat or state, or additional knowledge may be needed.

Population trends for the priority species have been calculated from data from the Breeding Bird Survey. Riparian areas, wet meadows, sage/grass, and aspen forests are habitats within the project area that can be especially impacted from livestock grazing. These habitats are high priority habitats identified in the Wyoming Bird Conservation Plan (Nicholoff 2003). Livestock grazing can result in decreased diversity of the structure and composition of these plant communities as well as decreased reproduction in willow and aspen communities. This could potentially decreased the abundance of some species of NTMB. The distribution and diversity of birds is highly associated with vegetation structural diversity (MacArthur and MacArthur 1961, Yasuda et. al. 1993). Studies show that where grazing simplifies vegetation structure or maintains vegetation in early seral condition, bird diversity and abundance generally decreases, particularly in the subcanopy (Scott et. al. 2003, Yasuda et. al. 2003). This result may benefit some species that use more open and simplified habitats such as mountain bluebird, robin, and brown-headed cowbird (Bock et al. 1992, Goguen and Mathews 2000), though generally species responding positively to livestock grazing effects are not high priority species and their viability is not of concern. In the case of the brown-headed cowbird, its range expansion and increase in population over the last century has negatively affected other species of songbirds through its practice of nest parasitism. Species requiring heavy shrub or herbaceous ground cover in riparian areas for nesting and/or foraging include yellow warbler and MacGillivray's warbler (Saab 1999, Nicholoff 2003). Species such as Wilson's warbler, common yellowthroat, savannah sparrow, and Lincoln's sparrow also require heavy shrub or herbaceous ground cover in riparian areas and show negative responses to livestock grazing (Bock et. al. 1992).

Non-game and Other Species

The allotments contain a variety of habitats supporting a diversity of other vertebrate species. This analysis assumes that quality habitat (defined in this circumstance as both watersheds and vegetation communities existing in "properly functioning condition") will support viable

1 The Wyoming Bird Conservation Plan (Nicholoff 2003) was developed by Wyoming Partners in Flight, a state-wide voluntary coalition of government agencies, conservation groups, academic institutions, private businesses, and concerned citizens dedicated to "keeping common birds common" and reversing downward population trends of declining species.

wildlife populations. Existing watershed and vegetation conditions (for each community type) are discussed in separate sections of this chapter.

Small mammals – Responses of small mammals to livestock grazing can vary depending on the species. Some studies have shown overall small mammal abundance to be higher in areas ungrazed by livestock compared to areas grazed by livestock (Bock et al. 1984, Medin and Clary 1989), while others have shown higher abundance in grazed areas or no differences (Medin and Clary 1990, Oldemeyer and Allen-Johnson 1988). Species such as western jumping mouse, redback vole, and mountain vole can be eliminated from an area with livestock use. Other species such as shrews, which are insectivorous, and montane voles have been documented to be more abundant in ungrazed areas compared to grazed areas (Medin and Clary 1990). Conversely, deer mice can greatly increase in density with grazing and generally this species accounts for the high number of small mammals observed in grazed areas. Species negatively affected by livestock grazing are generally those that require residual vegetation and litter. These conditions provide for food, cover which provides protection from predators allowing for more activity during the day, maintenance of favorable microclimate, and more hospitable subnivean space where residual vegetation prevents hard packing of snow (Bock et. al. 1984, Medin and Clary 1989).

THREATENED, ENDANGERED, PROPOSED, AND SENSITIVE SPECIES

This section identifies the existing condition of Threatened, Endangered, Proposed, and Sensitive (TEPS) animal and plant species within the project area. A separate Biological Assessment for Threatened and Endangered Species will be submitted to US Fish and Wildlife Service (USFWS) as a part of this analysis. A Biological Evaluation for sensitive species is incorporated into this document.

Threatened, Endangered, and Proposed Species

Under the provisions of the Endangered Species Act (ESA), federal agencies are directed to seek to conserve Threatened and Endangered species. Agencies are also directed to ensure that the actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any Threatened or Endangered species, or result in the destruction or adverse modification of their critical habitat. No "critical" habitat (designated by the USFWS) for Threatened or Endangered species is contained in the project area. The following list of Threatened and Endangered species was provided to the Bridger-Teton National Forest by the USFWS in May, 2003 (ES-61411).

Table 3-2
Threatened, Endangered, and Proposed Species Known or Suspected to Occur within the Area of Influence of the Project Area

Species Name	Federal Status	Within Area of Influence of Proposed Action?
Grizzly bear (*Ursus arctos horribilis*)	Threatened	Known
Bald eagle *(Haliaetus leucocephalus)*	Threatened	Known
Canada lynx *(Lynx canadensis)*	Threatened	Known
Kendall Warm Springs dace *(Rhinichthys osculus thermalis)*	Endangered	Known
Bonytail chub *(Gila elegans)*	Endangered	Not Suspected
Colorado pikeminnow *(Ptychocheilus lucius)*	Endangered	Not Suspected
Humpback chub *(Gila cypha)*	Endangered	Not Suspected
Razorback sucker *(Xyrauchen texanus)*	Endangered	Not Suspected
Gray wolf *(Canis lupus)*	Experimental	Known
Mountain plover *(Charadrius montanus)*	Proposed	Not Suspected

Threatened Species

Grizzly bear *(Ursus arctos horribilis)*

The Greater Yellowstone Area (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.

Since 1975, the estimated annual population for the Yellowstone population has increased. Some of this increase may be due to changes in survey methodology (Haroldson, 1998). However, because these estimates are based on actual observations, they represent a minimum and are believed to be conservative. Recent calculations of the population's growth rate have shown an increasing trend (Eberhardt and Knight, 1996).

Since 1986, management of the Yellowstone population has been shaped by the Interagency Grizzly Bear Guidelines (Guidelines) prepared by the Interagency Grizzly Bear Committee, 1986. The Guidelines were developed in an effort to provide effective direction for the conservation of grizzly bears and their habitat to the federal agencies responsible for

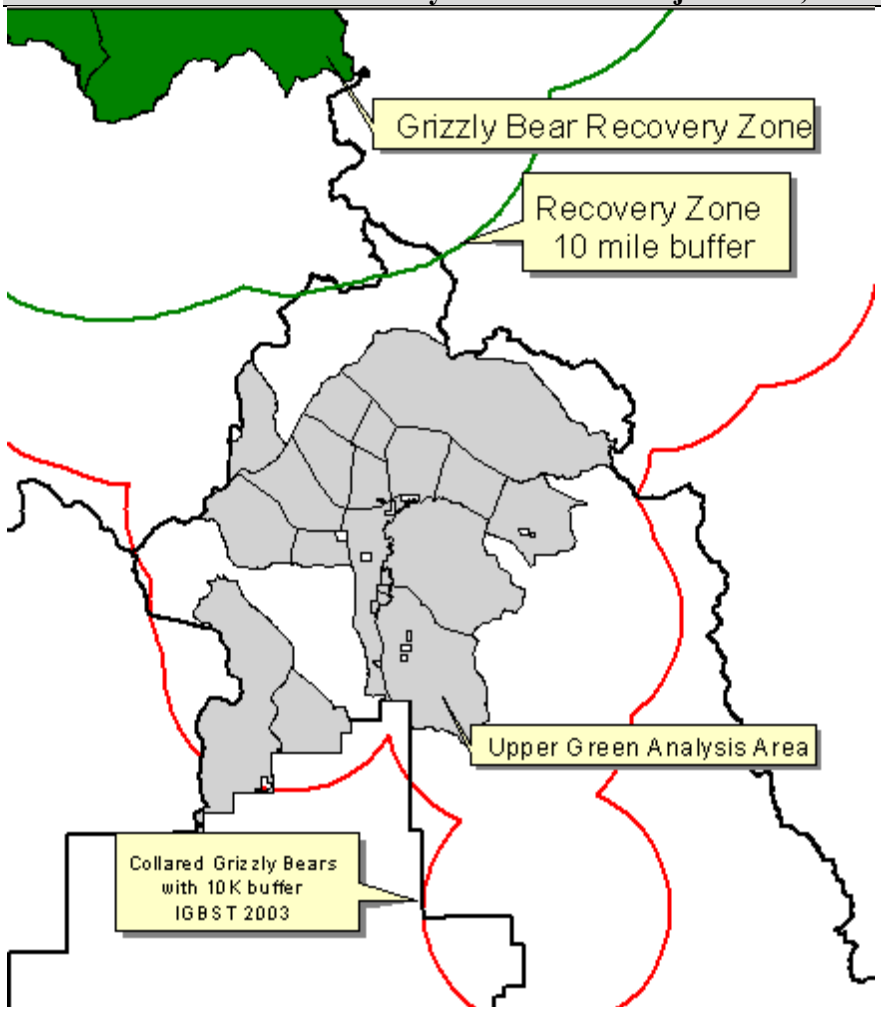
managing land within the recovery zone. The Guidelines were submitted to the USFWS for formal consultation, as required by 50 C.F.R., Sec. 402.04. The USFWS responded with a Biological Opinion that stated, "It is our opinion that implementation of the Guidelines will promote conservation of the grizzly bear." The Interagency Grizzly Bear Committee (IGBC) subsequently approved the application of the Guidelines on federal lands throughout grizzly bear ecosystems in Idaho, Montana, and Wyoming.

The Grizzly Bear Recovery Plan (USFWS, 1993) outlined the following demographic recovery goals for the Yellowstone population:

1. Fifteen females with cubs present (over a running six-year average) inside the recovery zone and within a ten-mile area immediately surrounding it;
2. Sixteen of eighteen Bear Management Units (BMU's) occupied by females with young (determined by a running six-year sum of verified sightings and evidence), and no two adjacent BMU's unoccupied;
3. Known human-caused mortality not to exceed four percent of the population estimate (based on the most recent three-year sum of females with cubs); and
4. No more that thirty percent of the four percent mortality limit shall be females. Mortality limits cannot be exceeded during any two consecutive years for recovery to be achieved.

These demographic criteria apply to both the recovery zone and a 10-mile wide buffer area around it. Because many bears with home ranges inside the recovery zone also use areas outside, but immediately adjacent to, the recovery zone, population monitoring includes the 10-mile buffer area. The project area lies outside both the recovery area and the 10-mile buffer. However, collared animals utilizing the recovery area also occupy the project area, along with a number of uncollared grizzly bears. Figure 3-2 displays the distribution of collared grizzly bears within the project area (based on unpublished Interagency Grizzly Bear Study Team data). The distribution of uncollared animals is not shown.

Figure 3-2
Distribution of Collared Grizzly Bears in the Project Area, 1983-2001



The number of females with cubs exceeded 15 each year from 1988 to 2001, and the total human-caused and female mortality rates were under the established threshold for the same time period. Grizzly bear females with cubs occupied 16 or more of the BMU's in 1997, 1999, 2000, and 2001 (Interagency Grizzly Bear Study Team, 2001).

Adult male grizzly bears often occupy more secure sites (Mattson, 1990), forcing adult females and subadult males to forage closer to humans, which makes them more likely to become habituated to humans. However, adult and subadult males are more likely than females to prey on livestock. Thus, livestock grazing in the project area would likely have the greatest effect on adult and subadult males. This prediction is also supported by the fact that most of the bear/livestock conflicts documented in the project area since 1996 have involved subadult and adult males.

One of the most challenging and controversial aspects of grizzly bear conservation in the Yellowstone ecosystem has been management of the grizzly bear-livestock interface. Historically, predator control of carnivores was widespread (Anderson et al., 1997) and contributed significantly to the grizzly bear's decline throughout the western United States. Approximately 392 active grazing allotments encompass over 4 million acres of public land in the GYA (Mack et al., 1992). On a seasonal basis, approximately 105,000 sheep, 77,350 cattle, and 1,200 horses occupy these allotments (Mack et al. 1992). Grizzly bear conflicts with livestock throughout the ecosystem have been managed according to the Guidelines, which include a protocol for nuisance bear management. A total of 241 conflicts involving bears and cattle were recorded in the Greater Yellowstone Area from 1992 through 1998. The vast majority of these conflicts involved calves.

Incidents on the Bridger-Teton National Forest accounted for 23 percent of all grizzly bear/human conflicts reported in the Greater Yellowstone Area between 1992 and 1999. These conflicts included human injuries, nuisance bears associated with unsecured human foods and garbage, and livestock depredations. Over 83 percent of these conflicts were classified as livestock depredations, and most of those occurred in or near the project area and other adjacent cattle and domestic sheep allotments.

In Wyoming, in 2001, 29 cattle were killed or injured by grizzly bears in 28 separate incidents. This represented a 25 percent decrease from the number of losses reported in 2000, and a 27 percent decrease from the 5-year average of 41 cattle per year (from 1996-2000). Four of the 29 losses occurred in the Upper Green area of the Bridger-Teton National Forest; two of these four occurred within the project area.

Thirty-eight sheep were also killed in 27 incidents in 2001. This represented a 450 percent increase in the number of incidents and a 36 percent increase in the number of sheep killed compared to 2000. This number was also 35 percent higher than the 5-year average. All sheep losses occurred in the Upper Green area of the Bridger-Teton National Forest adjacent to the cattle allotments in the project area (Gunther et al 2002).

In 2001, the Upper Green area was identified as one of six geographic areas within the GYA having high numbers of gizzly bear/livestock conflicts, represented primarily by sheep depredation (Gunther et al., 2002). There were 166 grizzly bear/livestock conflicts reported in the Upper Green area between 1995 and 2002. Only 76 of these incidents involved cattle. Fourteen grizzly bears were trapped, three were euthanized, and the remainder were moved to other locations within the GYA. Actual losses of domestic livestock are probably higher than the "confirmed" number. Given the large geographic area and small numbers of riders and herders, some livestock losses to predators and natural causes go undetected. Cattle losses are particularly difficult to assess, as the animals are widely distributed and not tended as closely as sheep.

Bald eagle *(Haliaetus leucocephalus)*

The bald eagle was federally listed as an endangered species in Wyoming in March, 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001) and was relisted in 1978 under the ESA of 1973 (43 FR 6233). The Pacific States Bald Eagle Recovery Team

was formed as a result of the 1978 listing, and a recovery plan was completed in 1986 (U.S. Fish and Wildlife Service 1986). Bald eagles were down-listed from endangered to threatened in Wyoming in 1995, and in July of 1999 a proposal to delist them was issued in the federal register. No final action on the 1999 proposal to delist has occurred to date.

In 1983, the Greater Yellowstone Ecosystem Bald Eagle Working Team published a bald eagle management plan for the GYA (GYE Bald Eagle Working Team 1983). Its intended purpose was to identify specific threats to the GYE bald eagle population and provide management recommendations and direction at a detailed level not covered in national and regional recovery plans. Thus, it served to implement the applicable recovery plans at a local level. This plan was updated in 1995 (Greater Yellowstone Bald Eagle Working Group 1996).

Prior to its first listing as an endangered species in 1967, about 30-35 occupied nesting territories were known (GYE Bald Eagle Working Team 1983). During the 1970's the population began rapid growth, however, reaching over 100 known occupied nests by 1995 (Greater Yellowstone Bald Eagle Working Group 1996). In 1998, 118 breeding territories were known, of which 105 were occupied.

Since 1983, the Greater Yellowstone Bald Eagle Working Group (GYBEWG) has guided management of bald eagles in the GYE. Bald eagle management in the project area has and continues to revolve around WGFD conducting annual nest surveys and monitoring nest territory occupancy and productivity. Management strategies and population goals for bald eagles are directed by the Bald Eagle Recovery Plan (USFWS 1986).

Bald eagles are closely associated with water, and their nest sites are commonly found less than one mile from a lakeshore or riverbank. Large trees (typically cottonwood or one of several conifer species), often the largest in the stand, 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 bald eagles, because snags and open-canopied trees located near the nest site and foraging areas offer favorable perch sites. 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 (Harmata and Oakleaf 1992). Abundant summer and winter habitat is available to bald eagles in the project area. Fish, waterfowl, and carrion provide plentiful food sources, and discharge from Kendall Warm Springs often keeps a large stretch of the Green River ice-free all winter long.

One known, occupied bald eagle nest site exists inside the project area. The site is located north of Dollar Lake in the Upper Green allotment. A draft nest management plan was written for this nest in 1995. A second nest is located adjacent to the Upper Green allotment, but outside the project area, at the southern end of Lower Green River Lake.

Canada lynx *(Lynx canadensis)*

The project area is identified as lynx habitat, according to the *Lynx Conservation Agreement and Strategy* (LCAS) (Ruediger et al., 2000). Lynx habitat is closely associated with the habitat requirements of the snowshoe hare (*Lepus americanus*), its primary prey. (Red

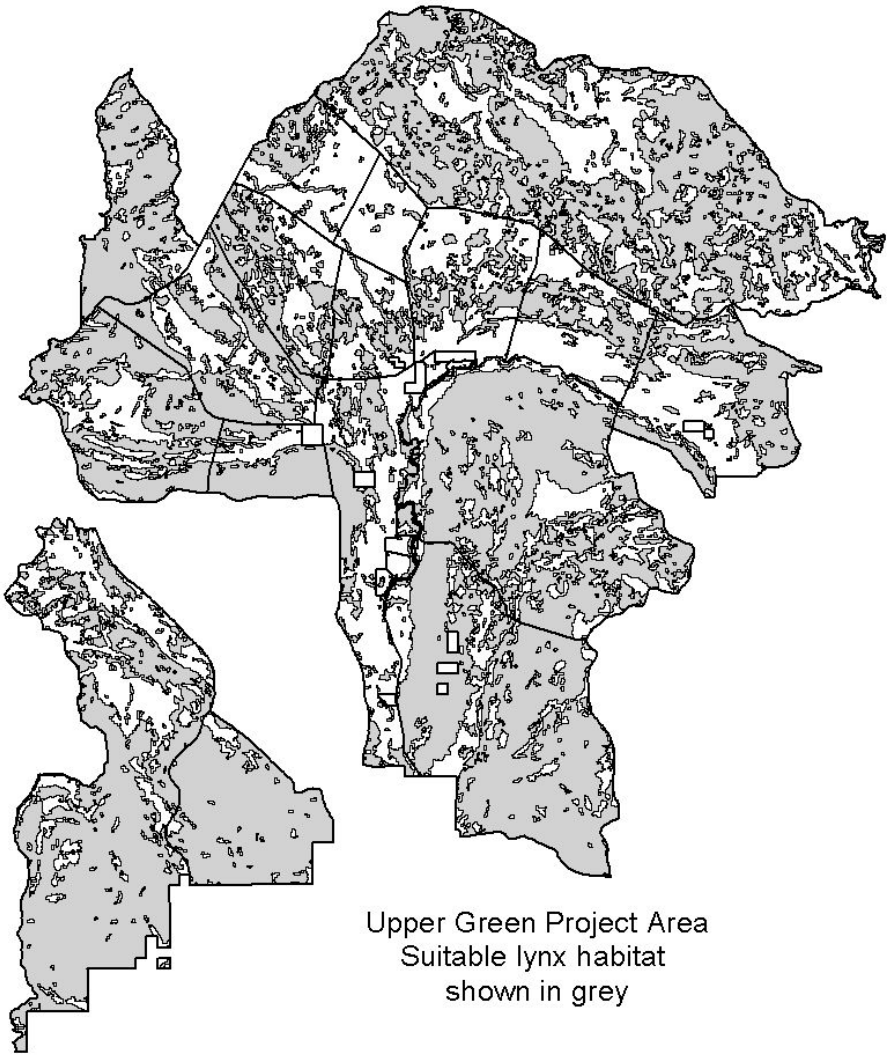
squirrels, ground squirrels, and grouse can serve as alternate prey.) Hares prefer dense mixed conifer stands for cover, with meadows and other openings for feeding. Snowshoe hares rely heavily on woody browse for winter forage. Their habitat use is highly correlated with high horizontal cover from 1-3 meters above ground (Hodges 1999) and hare abundance has been shown to be positively correlated with density of understory vegetation (Ruggerio et al. 1999). Both high elevation willow riparian areas and aspen forests provide winter forage and cover for hares, and livestock grazing has potential to impact this habitat. Voles and other litter-dwelling small mammal prey species require litter and residual vegetation for food, cover which provides protection from predators allowing for more activity during the day, maintenance of favorable microclimate, and more hospitable subnivean space where residual vegetation prevents hard packing of snow (Bock et. al. 1984, Medin and Clary 1989)

Mature forests with downed logs and windfall provide denning and security cover for lynx. Lynx are found in high elevation areas where deep snows give them a competitive advantage over other predators. The historic "tie hack" areas appear to be providing high-quality lynx habitat within the project area. These areas contain multi-storied, mixed conifer stands with dense understories of regenerating spruce and fir trees. Livestock grazing is generally concentrated in open areas that lynx typically avoid; therefore little direct overlap between livestock and lynx habitat would occur in the project area.

Lynx and lynx tracks have been documented in the project area. A resident population has been documented in the adjacent Wyoming Range, where two lynx (a female and a male) were captured and radio collared. The home ranges for these to animals averaged 12,350 acres for the female and 216,000 acres for the male. Estimates of the male's home range varied from about 25,000 to 250,000 acres, as he repeatedly made long (200-450 mile), yearly exploratory movements, including several trips through the project area. The two lynx used areas ranging from 6,360 and 10,590 feet in elevation, with the female's average at 8,480 feet and the male's average at 8,495 feet (Squires et al 2001).

Lynx analysis units (LAU's) have been delineated across the Bridger-Teton National Forest and provide the fundamental scale with which to evaluate and monitor the effects of management actions on lynx habitat. LAU's encompass both lynx habitat (which may, or may not, be in suitable condition) and non-lynx habitat, such as lakes and rock talus. Approximately seven LAU's, corresponding to the fifth code hydrologic unit (HUC), overlap the project area: 1704010204, 1704010205, 1404010113, 1404010114, 1404010115, 1404010116, and 1404010118. Approximately 60 percent of the project area (102,845 acres) has been identified and mapped as suitable lynx habitat. Specific lynx conservation measures and direction for livestock grazing are contained in the LCAS and in Chapter 4 of this document. These measures apply only to lynx habitat on federal lands within the LAU's.

Figure 3-3
Suitable Lynx Habitat in the Project Area



Endangered Species

Kendall Warm Springs dace *(Rhinichthys osculus thermalis)*

The only known population of the Kendall Warm Springs dace occurs in Kendall Warm Springs. Kendall Warm Springs lies within the project area, approximately 32 miles north of Pinedale, Wyoming.

Bonytail *(Gila elegans)*, Colorado pikeminnow *(Ptychocheilus lucius)*, humpback chub *(Gila cypha)*, and razorback sucker *(Xyrauchen texanus)*

All four of these species occur only in the Colorado River system, where their distribution and abundance are far below historic levels, due to the effects of dams and exotic fishes.

Although none of these species may be found in the project area, water depletion from the Colorado River basin may jeopardize the continued existence, or modify the critical habitat, of these four Endangered species. Current and proposed water depletion estimates are discussed in Chapter 4 of this document.

Experimental Population

Gray wolf *(Canis lupus)*

Although gray wolves are native to the Bridger-Teton National Forest, they were extirpated by humans by the late 1920's (U.S. National Park Service, 2000). Since the late 1960's, unverified sightings of wolves and wolf tracks in Grand Teton National Park (Grand Teton National Park wildlife observation files) and in and around the Bridger-Teton National Forest (BTNF wildlife files) have been reported.

In 1973, the northern Rocky Mountain wolf subspecies (then known as *Canis lupus irremotus*) was listed as Endangered, and in 1978, the legal status of the gray wolf south of Canada was listed as Endangered (the Minnesota wolf population was listed as Threatened). The USFWS made the decision to reintroduce the gray wolf (*Canis lupus*) into Yellowstone National Park in1994 and classify this population as "nonessential experimental wolves," according to section 10(j) of the Endangered Species Act of 1973, as amended (U.S. Fish and Wildlife Service, 1994). The anticipated date of recovery for the gray wolf was 2002, and the responsibilities for wolf management were to be turned over to individual state and federal agencies at that time, provided they had developed acceptable management plans. State management plans have not been implemented to date, and all wolf populations occurring in the state of Wyoming are classified as "nonessential experimental."

Wolf reintroduction efforts in Yellowstone began in the winter of 1994/1995, and a total of 31 wolves were released over a two-year period. The recovery plan for wolves in the Rocky Mountain area set a goal of establishing 10 or more breeding pairs of wolves in each of the three recovery areas (northwestern Montana, central Idaho, and the Greater Yellowstone Area) for three successive years (Bangs et al., 1998). Wolf recovery progressed more quickly than predicted. Populations became established within two years of reintroduction, instead of taking the three to five years that had initially been projected (Bangs et al., 1998). In 2001, at least 131 wolves comprising 10 packs were present in Yellowstone National Park (YNP). Outside YNP, 67 to 81 wolves made up 8 packs (USFWS et al., 2003).

In 1998, three of the GYA packs (the Teton, Gros Ventre, and Soda Butte packs) included the Bridger-Teton National Forest in their home range. Two of these packs also used the BTNF in 2000. The Green River pack established itself in the Upper Green area in 2001. In summary, the project area has been used by the Teton pack (in 2000, 2001, and 2002), the Green River pack (in 2001 and 2002), and the Gros Ventre pack (in 2002). Sightings of numerous single wolves have also been documented in the Upper Green area.

Wolf livestock depredation has occurred north of the project area within the Fish Creek and Bacon Ridge cattle allotments, as well as to the west within the Elk Ridge Complex sheep allotments. Cattle depredation occurred within the project area starting summer 2003. At

least nine cattle were killed by wolves in the Upper Green area and one sheep was killed on the adjoining Elk Ridge Allotment complex.

Wolf pack activity and single wolves are common in the area year round. Rates of depredation vary widely over time, and do not necessarily increase with increasing wolf populations (Bangs et al. 1998). In some areas, packs may continuously occupy areas used for livestock without conflicts. Other packs regularly exposed to livestock may depredate following one or more years without conflict (Bangs et al. 1994). Security areas are present for wolves and large ungulates in the adjacent Gros Ventre and Bridger Wildernesses.

USFWS personnel actively monitor wolf activity throughout Wyoming and the project area. USFWS personnel also work closely with livestock permittees to minimize conflicts where possible and to target specific animals when problems arise. Guidance for handling problem animals is outlined in the Final Rule (USFWS 1994). The USFWS addressed concerns of livestock producers using federal lands by allowing the USFWS or agencies designated by the USFWS to "take wolves that are determined to be 'problem' wolves. These include wolves that attack livestock. In addition, "when six or more breeding pairs are established in the experimental population area, lethal control of problem wolves or permanent placement in captivity will be authorized but only after other methods to resolve livestock depredations have been exhausted", and there is evidence of wolves killing livestock and current livestock management practices are followed. This will be a last resort and will be authorized only after live capture attempts have failed or there is clear endangerment to human life.

The Forest will not require the livestock permittees to do any special preventative measures to reduce chances of livestock depredations by wolves. However, measures undertaken to prevent grizzly bear depredations should reduce chances of livestock depredations by wolves. For example, livestock carcasses are considered an "attractant" for wolves as well as grizzly bears. Existing carcass removal mitigation for bears matches similar requirements for wolves (USFWS 1994). In addition, the Forest will work with the USFWS and willing livestock permittees in an attempt to reduce potential depredation by wolves. This will be on a voluntary basis for the livestock permittees. Suggestions are listed in Chapter 4.

Proposed Species

Mountain plover *(Charadrius montanus)*

Mountain plover are found in shortgrass prairie and shrub-steppe habitats across Wyoming. They inhabit arid shortgrass prairies dominated by blue grama and buffalo grass with scattered clumps of cacti and forbs. They are also found in low and open vegetation, such as prairie dog towns and saltbush habitats of the shrub-steppe of central and western Wyoming. They are adapted to sparsely vegetated and bare ground areas associated with various disturbances (e.g. heavy grazing, fire, prairie dog colonies) (Nicholoff 2003).

Mountain plover are found in lower elevation, short-grass prairie and shrub-steppe landscapes to the south of the project area. No potential mountain plover habitat exists within the project area.

Mountain plover are a Level I priority species for Wyoming.

Sensitive Fish and Wildlife Species

Sensitive species are defined as those plant and animal species (identified by the Regional Forester) for which population viability is a concern, as evidenced by a:

- Significant current, or predicted, downward trend in population numbers or density; or
- Significant current, or predicted, downward trend in habitat capability that would reduce a species' existing distribution (FSM 2670.5).

The Forest Service objective (FSM 2670.22) for sensitive species management is to "develop and implement management practices to ensure that species do not become Threatened or Endangered because of Forest Service actions." A Biological Evaluation for Sensitive species is consolidated into the main text of this EIS.

The fish and wildlife species listed below in Table 3-3 have been designated as Sensitive by the Intermountain Region of the Forest Service and may occur within the project area. Population surveys have been conducted for some species. Suitable habitat exists in the project area for Colorado River cutthroat trout, Snake River fine spotted cutthroat trout, spotted frog, common loon, Harlequin duck, trumpeter swan, boreal owl, flammulated owl, three-toed woodpecker, wolverine, northern goshawk, great gray owl, peregrine falcon, and greater sage-grouse.

Table 3-3
Intermountain Region Sensitive Fish and Wildlife Species in the Project Area

Species Name	Within Area of Influence of Project Area
Colorado River cuttthroat trout *(Oncorhynchus clarki pleuriticus)*	Known
Snake River fine spotted cutthroat trout *(Oncorhynchus clarki ssp)*	Known
Spotted frog *(Rana pretiosa)*	Known
Common loon *(Gavia immer)*	Known
Harlequin duck *(Histrionicus histrionicus)*	Suspected
Trumpeter swan *(Cyngus buccinator)*	Known
Boreal owl *(Aegolius funereus)*	Suspected
Flammulated owl *(Otus flammeolus)*	Suspected
Three-toed woodpecker *(Picoides tridactylus)*	Known
Townsend's big-eared bat *(Plecotus townsendii)*	Not suspected
Wolverine *(Gulo gulo)*	Known
Fisher *(Martes pinnanti)*	Not suspected
Northern goshawk *(Accipiter gentilis)*	Known
Great gray owl *(Strix nebulosa)*	Known
Spotted bat *(Euderma maculatum)*	Not suspected
Peregrine falcon *(Falco pergrinus)*	Known
Greater sage-grouse *(Centrocercus urophsianus)*	Known
Pigmy rabbit *(Brachylagus idahoensis)*	Not suspected

Colorado River cutthroat trout *(Oncorhynchus clarki pleuriticus)*

Colorado River cutthroat trout (CRC) were historically distributed throughout the headwaters of the Green and Colorado rivers as far south as the San Juan River, perhaps occupying the lower reaches of large rivers in winter (Young, 1996). Currently, CRC populations are

limited to a few small headwater streams of the Green River and upper Colorado River in Colorado, Utah, and Wyoming.

CRC require cool, clear water and streambanks with vegetation sufficient to provide cover and contribute to streambank stability. In-stream cover, in the form of deep pools, boulders, and logs, is also an important part of their habitat. CRC are adapted to relatively cold water, and they thrive at high elevations (Spahr et al., 1991; Young, 1995). There are several CRC populations in the Upper Green River sub-basin; however, they are isolated in small stream segments on public lands. Native CRC populations are present in two streams (Tepee Creek and Rock Creek) in the project area.

Snake River fine-spotted cutthroat trout *(Oncorhynchus clarki ssp)*

Snake River fine-spotted cutthroat trout (SRC) have similar habitat requirements as the CRC. Native SRC populations have been largely replaced by brook, brown, and rainbow trout and by hybrid rainbow/cutthroat populations (Behnke, 1992; Gresswell, 1995). Although the native range for SRC has been altered by erosion, siltation, and irrigation diversions related to agricultural practices (Spahr et al., 1991), SRC populations have not declined significantly in their native range.

Spotted frog *(Rana pretiosa)*

Potential and occupied spotted frog habitat exists within the project area. This habitat primarily includes oxbow ponds (without fish) with emergent sedges *(Carex sp.)* located in wet meadows at the edge of lodgepole pine forest. Riparian areas also often provide critical breeding, foraging, and over-wintering habitats, and migratory and dispersal corridors, for amphibians such as spotted frogs. Frogs move considerable distances from water after breeding, often frequenting mixed conifer and subalpine forests, grasslands, and shrublands of sagebrush and rabbitbrush (Maxell 2000).

Both spotted frogs and boreal toads (and their breeding sites) have been found in several locations throughout the project area during surveys (Patla 2000). Leopard frogs may also be present in the project area. Although they are not on the Intermountain Region Sensitive species list, boreal toads and leopard frogs are species of special concern in Wyoming.

Riparian areas often provide critical breeding, foraging, and overwintering habitats for amphibians such as spotted frogs. These areas also provide migratory or dispersal corridors. Because riparian areas are usually preferred by livestock, grazing is likely to have a number of direct and indirect impacts to amphibians. Impacts include direct mortality from trampling, habitat alteration by removal or reduction of herbaceous and shrub cover, stream bank collapse, soil compaction, and water contamination and eutrophication (Maxell 2000). Breeding sites are particularly susceptible to damage from intensive livestock use in mid to late summer when larvae are transforming and leaving the breeding area (Patla 2000).

Amphibians in general are very susceptible to chemical contamination. The effects range from direct mortality to sublethal effects such as depressed disease resistance, inhibition of growth and development, decreased reproductive ability, inhibition of predator avoidance

behaviors, and morphological abnormalities. If chemical herbicides are utilized, they should not be applied within 100 meters of water bodies or wetlands (Maxell 2000).

Common loon *(Gavia immer)*

The common loon is found on lakes across most of Wyoming during migration, but nests only in northwestern Wyoming. Lakes that are suitable for loon breeding habitat include those that are at least 10 acres (4 ha), although reproductive success is better on lakes that are greater than 25 acres (10 ha); are free of human disturbances or have areas that are secluded from human activity; are between 6,000 and 8,000 feet (1830 and 2440 m) in elevation; have clear water with a minimum visibility of 10 to 13 feet (3 to 4 m), as loons are visual predators; have islands or protected shore areas for nesting and raising young; have abundant populations of small to mid-sized fish; are greater than 6 feet (2 m) deep to prevent winter kill of fish; and remain ice free for at least 4 months to allow young to fledge. Ideal loon nesting lakes also generally have at least partially forested, rocky shorelines; an area of shallow water with emergent vegetation; and a steep slope adjacent to the shoreline for an underwater approach to the nest. Loons feed by diving from the surface and pursuing fish; may also take some aquatic invertebrates, especially crustaceans. They winter south to northern Mexico on coasts, bays, and estuaries. The common loon is threatened by loss of nesting habitat. They may be threatened by acid rain, which kills fish that are used as food. They are intolerant of human disturbances, which may cause nest desertion. Nests may be flooded by boat wakes or water level fluctuation (Nicholoff 2003).

Common loon sightings or nesting is not documented within the project area. Although suitable habitat is present, it appears loons utilize the Pinedale District most often as transition range between summer and winter ranges. The common loon is a Level II priority species for Wyoming.

Harlequin duck *(Histrionicus histrionicus)*

Harlequin ducks are found only in the northwestern corner of Wyoming. They prefer cold, shallow, rapid mountain streams away from concentrated human activities. Nesting habitat includes very low gradient stream sections with dense shrubs lining the banks, braided channels, swift currents, and water rich in aquatic insects. Harlequin ducks nest on the ground or in a tree cavity. The nest is a mass of down concealed in a rock crevice or cavity along a stream. They are a diving duck that eats crustaceans, mollusks, insects, and fish. They winter in marine waters along the Pacific coast. Harlequin duck presence on a particular stream is an indicator of high water quality. Their nesting success is impacted by stream degradation due to sedimentation, channelization, logging, incompatible recreation, and incompatible livestock grazing (Nicholoff 2003).

Suitable habitat for this species exists within or near the project area although no harlequin ducks have been documented. The closest documented sightings are along Pine Creek near Fremont Lake. These ducks are a Level II priority species for Wyoming.

Trumpeter swan *(Cygnus buccinator)*

Management strategies and population goals for trumpeter swans are directed by the Trumpeter Swan Recovery Plans (Pacific Flyway Study Committee 2002, Patla 2001, and Subcommittee on Rocky Mountain Trumpeter Swan 1998). These swans are a Level I priority species for Wyoming.

Historically, trumpeter swans nested within the project area. WGFD personnel suspect swans successfully nested through the late 1980's. Presently there is one known nest in the Upper Green allotment. Formal surveys have been conducted for potential and occupied habitat within the project area. The WGFD has a management goal of 10 breeding pairs in the Upper Green River Basin and began reintroducing young swans adjacent to National Forest lands in 1992. WGFD plans to continue releasing birds. Several lakes on National Forest system lands and within the project area have been identified as potential occupied habitat and/or release sites. Single birds and groups of swans are often seen in suitable habitat throughout the project area during spring, summer, and fall, especially within the Upper Green allotment.

Trumpeter swan nest sites and territories are often the same from year to year. They nest on a wide variety of freshwater ponds, lakes, and occasionally rivers. They prefer areas with abundant and diverse communities of aquatic plants. Nest sites are usually partially sheltered.

Boreal owl *(Aegolius funereus)*

Boreal owls are found primarily in western Wyoming and in the Sierra Madre range of south-central Wyoming. They inhabit mature, high elevation forests of Engelmann spruce, subalpine fir, and/or mature lodgepole pine; interspersed mature aspen stands are also important as they usually provide more nesting cavities than spruce-fir. They breed at elevations of 6,560 to 10,630 feet (2,000 to 3,240 m). These owls require large areas of interspersed forests that include mature and old growth spruce-fir, as home ranges are usually greater than 2,500 acres (1,000 ha). They prefer a structure that is typical of mature and old growth forests (i.e. large downed logs, a high overstory canopy, and large snags). They also prefer areas with many openings or an open stand structure for foraging, and trees with large cavities. Their nests are usually in an existing cavity 10 to 20 feet (3 to 6 m) above ground. As secondary cavity nesters, they rely on woodpeckers (in this area, primarily northern flickers) to excavate snags and decaying trees, which they subsequently use for nesting and roosting. Males arrive at potential breeding territories in late winter (mid-February) and begin calling to attract females by late February or early March. They primarily eat small mammals, especially red-backed voles, but will also eat birds, insects, and frogs. These owls are a year-round resident in Wyoming. They do not migrate, but are nomadic in response to cyclic prey populations. Distribution and abundance are largely associated with nest cavity availability and prey populations. Forest fragmentation and removal of mature forest habitats on a regional scale may harm populations (Nicholoff 2003). . The Project Area provides suitable nesting and foraging habitat. Livestock grazing could affect foraging habitat for some prey species of boreal owls such as voles and shrews by reducing residual vegetative cover.

Extensive owl surveys conducted within the Grey's River drainage (Clark, 1994) determined that boreal owls were primarily found in spruce-fir habitat located between 6,800 and 8,500 feet in elevation (all breeding sites were located above approximately 6,900 feet). The owls were detected in multi-layered stands with high structural complexity, usually close to small, wet meadows with complex perimeters (Clark, 1994).

Suitable boreal owl habitat exists in the project area. Although they have not been documented during the survey work that has been conducted, it is suspected that boreal owls are present in the project area. Boreal owls are a Level II priority species for Wyoming.

Flammulated owl *(Otus flammeolus)*

Flammulated owls prefer ponderosa pine habitat; however, they will also utilize Douglas-fir, aspen, or limber pine stands, which are present in the project area. Flammulated owls are secondary cavity nesters. They feed primarily on nocturnal lepidopteron moths, which they glean from the foliage. The two key habitat features that may limit flammulated owl populations are the availability of nest cavities and the availability of prey, particularly beetles, grasshoppers, and moths (Linkhart et al 1998, McCallum, 1994). Suitable flammulated owl habitat in the Intermountain West is characterized by open stands of mature Douglas-fir maintained by frequent, low intensity fires. Prey is more abundant and accessible in open forest stands with grass and shrub understories. Aspen stands may also be used for nesting and foraging activities.

Flammulated owls have not been documented on the Pinedale Ranger District. It is suspected that they are rare, but are present, in the project area. They are considered rare throughout Wyoming and do not have a priority rank.

Three-toed woodpecker *(Picoides tridactylus)*

Three-toed woodpeckers inhabit montane stands of coniferous, deciduous, and mixed trees. In Wyoming forests, they are found in large, unbroken stands of mature spruce-fir and lodgepole pine, where they tend to be associated with recent fires and bark beetle infestations (Hoffman 1997). They require snag densities at 1 per 5 to 7 acres. Three-toed woodpeckers excavate a new cavity for nesting each year, which, in the GYA, is generally located in moist, coniferous forests on relatively gentle terrain (Hoffman,1997). They prefer snags at least 12 inches (30 cm) dbh and at least 15 feet (4.5 m) in height. Their nests are anywhere from 5 to 50 feet (1.5 to15 m) above ground (Nicholoff 2003).

Three-toed woodpeckers generally forage on insects (primarily bark beetles) in dead trees; however, they will also feed in live trees. As they forage by scaling the bark from trees, they prefer trees with scaly bark, which include, in this area, lodgepole pine and spruce. When foraging in burned trees, three-toed woodpeckers primarily select trees that are only lightly to moderately burned (Burdett and Niemi 2002, Murphy and Lehnhausen 1998). Three-toed woodpeckers have been documented during surveys in the Moose/Gypsum portion of the project area. This woodpecker is a Level II priority species for Wyoming.

Townsend's big-eared bat *(Plecotus townsendii)*

Townsend's big-eared bat occupies a diversity of habitats and uses caves and abandoned mine shafts for day and hibernation roosts. In Wyoming, the elevation for the known distribution of Townsend's big-eared bat averages 7,000 feet. Although Townsend's big-eared bat could occur in appropriate habitat, they are not suspected to be in the project area.

Wolverine *(Gulo gulo)*

Wolverines inhabit high mountain forests of dense conifers (primarily in true fir cover types), as well as subarctic-alpine tundra. Wolverines studied in central Idaho preferred mature montane forest in association with subalpine rock and scree habitats (Copeland and Hudak, 1995). They move seasonally between higher and lower elevations in search of food. In winter, a large part of the wolverine's diet consists of big game carrion, but they also feed on a variety of small mammals and birds (Banci, 1994).

Wolverines are widespread. However, their populations occur in low densities, and they are difficult to observe. Therefore, the frequency of sightings may not reflect the actual size of the population. Large areas, free from land-use activities that permanently alter habitat, are needed to maintain wolverine populations (Ruggiero et. al., 1994). The home ranges of wolverines studied in central Idaho ranged from 80 to 700 square kilometers for females to greater than 2000 square kilometers for males (Copeland and Hudak, 1995). Home range sizes of wolverines are highly influenced by prey remains and other food sources. Individual animals generally have very large ranges and can cover large distances in very little time.

Wolverines have been documented in several locations near the project area. The allotments provide suitable habitat for wolverine including predicted reproductive denning habitat in the cirque basins mentioned below, though very little of this habitat is accessible to cattle. Foraging habitat occurs throughout the allotments and livestock grazing has potential to affect this habitat by reducing cover for some prey species of wolverine such as snowshoe hares, pikas, voles, marmots, and other litter-dwelling small mammal species. Potential wolverine denning habitat has been modeled following protocols outlined by Heinemeyer et al. 2001. Approximately 2500 acres of potential denning habitat is found in the project area. Potential habitat is all located in high elevation cirques, and has little overlap with modeled high and moderate expected use grazing areas.

Fisher *(Martes pinnanti)*

Fishers use closed coniferous and mixed forests. They prefer extensive, mature to old-growth spruce-fir forests with high levels of canopy closure (Wisdom et al., 2000). Large diameter snags and downed logs serve as maternal and natal dens for fishers and are an important feature their habitat. It appears that forest structure providing a diversity of tree sizes and shapes, understory vegetation, snags and low limbs is preferred. (Powell and Zielinki 1994) Fishers primarily prey upon small mammals, such as red-backed voles, red squirrels, and snowshoe hares, but they occasionally take larger species such as beaver (Witmer et al., 1998).

There have been no documented sightings (recent or historic) of fishers on the Bridger-Teton National Forest. In addition, no observations of fishers have been documented in the

Wyoming Natural Diversity Database (WYNDD 2001). Potential fisher habitat does exist in the project area.

Northern goshawk *(Accipiter gentilis)*

Northern goshawks inhabit montane stands of coniferous, deciduous, and mixed trees. They tend to select stands containing relatively large diameter trees and high levels of canopy closure for nesting (Siders and Kennedy1998). In a study conducted in south-central Wyoming and northeastern Utah, northern goshawks primarily selected lodgepole pine and aspen trees on moderate slopes (ranging from 1 to 34 percent) for nesting (Squires and Ruggiero 1996). They also used Douglas-fir, Engelmann spruce, and subalpine fir for nest trees, but they showed no preference for the aspect of the nest site (Squires and Ruggiero, 1996). On the Targhee Forest, in southeast Idaho, goshawks also used Douglas-fir and lodgepole pine on moderate slopes (ranging from 0 to 47 percent) with northerly or westerly aspects for nest sites (Patla, 1997). Northern goshawk nest sites are often located close to a perennial water source.

Goshawks exhibit high nest-site fidelity and may maintain several alternative nest sites within a territory. They typically return to their breeding territories in late March or early April and lay eggs in May. Chicks hatch by mid-June, fledge by late July, and are generally independent by early September. Goshawks prey upon a variety of small- and medium-sized mammals (such as red squirrels and snowshoe hares) and birds (such as woodpeckers, grouse, and jays) that they hunt from perches. Stands containing trees that are pole-size or larger in diameter tend to make suitable hunting areas.

Northern goshawks have been documented in the project area during surveys. They are a Level I priority species for Wyoming.

Great gray owl *(Strix nebulosa)*

Great gray owls inhabit montane stands of coniferous, deciduous, and mixed trees, usually bordering small openings or meadows. Semi-open areas near dense coniferous forests, where small rodents are abundant, provide optimal roosting and nesting habitat for these owls. They utilize broken-top snags, stumps, dwarf-mistletoe platforms, and old hawk or raven nests for nesting. They feed mostly on voles, but may take other small mammals and birds (Nicholoff 2003).

In studies conducted in the Grey's River drainage, great gray owls were primarily found in lodgepole pine stands near wet meadow complexes between 6,500 and 7,800 feet in elevation (Clark, 1994).

Great gray owls have been documented during surveys of the project area. They have been located in the Moose/Gypsum and Rock Creek Buttes areas. They are a Level II priority species for Wyoming.

Spotted bat *(Euderma maculatum)*

Spotted bats can occupy a variety of habitats, from desert to montane. In Wyoming, the elevation for the known distribution of spotted bats averages less than 4,000 feet, while the

highest documented elevation for the species is 11,300 feet in New Mexico (in spruce-fir habitat). Spotted bats primarily roost in steep, high cliffs. Appropriate habitat probably does not occur, and spotted bats are not suspected, within the project area.

Peregrine falcon *(Falco pergrinus)*

Peregrine falcons are closely associated with open water, wetlands, and riparian habitat. They are neotropical migrants that most commonly nest on large cliffs (greater than 200 feet high) under 9,500 feet in elevation. They forage in a variety of open habitats. Their main prey is other birds which they capture in the air. Peregrines arrive in their territories in early April and initiate egg laying in late April or early May. Young birds hatch in early June, fledge in mid- to late July, and then remain in the general area until September or October. Peregrines are most susceptible to disturbance during the breeding season. They are most sensitive during their courtship, egg-laying, and incubation periods. Human activity, especially above the nest area, can cause the abandonment of nests and reproductive failure.

Suitable peregrine falcon habitat exists within the project area, and one active peregrine eyrie (nest) is located immediately adjacent to the project area. The peregrine falcon is a Level I priority species for Wyoming.

Greater sage-grouse *(Centrocercus urophsianus)*

Management strategies and population goals for the sage-grouse are directed by the draft Greater Sage-Grouse Management Plan (WGFD 2003a). Sage grouse populations have been declining over the past five decades across most of their range. The purpose of the plan is to guide management efforts to reduce long-term population declines and to maintain and improve habitats. Sage-grouse are dependent on widespread areas of sagebrush habitats.

Livestock grazing can have both positive and negative impacts to these habitats. For example, short duration grazing in late spring early summer can improve both quantity and quality of summer forage for sage grouse. Conversely, continuous heavy grazing rarely leaves enough suitable residual cover for nesting. A healthy sagebrush community provides diverse age groups and structure classes necessary to sustain and/or increase sage-grouse populations (WGFD 2003a). The existing grazing system for project area provides deferred and rest rotation pastures as is recommended by the management plan.

The project area provides nesting and brood rearing habitat for the greater sage-grouse (Lyons, 1998). The greater sage-grouse is a Level I priority species for Wyoming.

Pygmy rabbit *(Brachylagus idahoensis)*

Pygmy rabbits are dependent on dense, tall thickets of sagebrush where deep, loose, soils are available for digging burrows. They are a sagebrush obligate. Pygmy rabbits spend the majority of their lives within 30 meters of their burrows. Their diet is dominated summer and winter by sagebrush. Summer diets also include some grasses and forbs (Gabler et al. 2001). They are considered rare in Wyoming and probably do not occur in the project area. Pygmy rabbits have been documented 50 miles south of the project area.

Sensitive Plant Species

The following plant species have been designated as Sensitive by the Intermountain Region of the Forest Service and are known to occur within the project area: Payson's milkvetch, seaside sedge, boreal draba, wooly fleabane, narrowleaf goldenweed, Payson's bladderpod, naked-stemmed parrya, Greenland primrose, and Weber's saw-wort. Other plant species that are designated as Sensitive, but are not known to occur in the project area include: pink agoseris, sweet-flowered rock jasmine, soft aster, meadow milkvetch, starveling milkvetch, black and purple sedge, Wyoming tansymustard, rockcress draba, Slickspot peppergrass and creeping twinpod. These species could occur in suitable habitat, but have not been located during existing surveys. Table 3-4 lists the Sensitive plant species known to be present in the project area and describes their habitats.

Table 3-4
Intermountain Region Sensitive Plant Species in the Project Area

Species Name	Habitat or Community Type	Elevation Range (Feet)	Successional Stage	Phenology
Payson's milkvetch *(Astragalus paysonii)*	Disturbed areas and recovering burns on sandy soil	6,700 to 9,600	Early	Flowering/fruiting June-August/July-October
Seaside sedge *(Carex incurviformis)*	Alpine and subalpine moist tundra and wet rock ledges	10,000 to 12,200	Late	Flowering/fruiting July-August
Boreal draba *(Draba borealis)*	Moist north-facing limestone slopes and cliffs and shady stream sides	6,200 to 8,600	Mid	Flowering/fruiting June-August/July-September
Wooly fleabane *(Erigeron lanatus)*	Alpine or subalpine limestone talus slopes	11,000	Mid to late	Flowering/fruiting July-August
Narrowleaf goldenweed *(Haplopappus macronema var. linearis)*	Semi-barren, whitish clay flats and slopes, gravel bars, and sandy lakeshores	7,700 to 10,300	Mid to late	Flowering/fruiting July-September
Payson's bladderpod *(Lesquerella paysonii)*	Rocky, sparsely-vegetated slopes, often calcareous substrates	6,000 to 10,300	Mid to late	Flowering/fruiting May-August
Naked-stemmed parrya *(Parrya nudicaulis)*	Alpine talus, often on limestone substrates	10,700 to 11,400	Early to late	Flowering/fruiting July-August
Greenland primrose *(Primula egaliksensis)*	Wet meadows along streams and calcareous montane bogs	6,600 to 8,000	Mid	Flowering/fruiting May-July/June-August
Weber's saw-wort *(Saussurea weberi)*	Alpine talus and gravel fields, often on limestone	10,200 to 11,200	Mid to late	Flowering/fruiting July-August

FISHERIES

The following discussions and analyses are based on the (Fisheries Resources Report for the Upper Green River Area Rangeland Project, May 5, 2003). Applicable direction for fisheries is also contained in Chapter 4 of the Forest Plan (pp. 123-127).

Desired Future Condition

To provide habitat adequate to meet the needs of dependent fish and wildlife populations including those of Threatened, Endangered, and Sensitive species.

Existing Condition

The analysis covers the tributaries to the Upper Green River within the project area. The south fork of Fish Creek, a tributary to the Gros Ventre River (which is a tributary to the upper Snake River), is also included. Streams in the project area contain populations of both native game and non-game fish species. However, this analysis is focused primarily on fish selected as Management Indicator Species.

Management Indicator Species

Some species found in the project area are designated as Management Indicator Species (MIS). Two species of fish are designated as Management Indicator Species for the Bridger-Teton National Forest, they are the Colorado River cutthroat trout and the rainbow trout.

Harvested Species

Harvest species in the project area include brook trout, brown trout, cutthroat trout, rainbow trout, and mountain whitefish. These species inhabit small headwater streams, large rivers, and lakes with silt-free substrate. They require a gravel stream riffle for successful spawning (lake populations move to tributaries to spawn). Deep, low velocity pools in streams provide important wintering habitat for these species.

Brook, brown, and rainbow trout are all non-native introduced species that compete for habitat, or, in the case of rainbow trout, interbreed with Colorado River cutthroat trout (a Sensitive species). Habitat is managed for these harvested species to achieve the fish population levels, harvest success, and recreation day objectives established by WGFD.

Non-game Native Species

Two common, native non-game fish species inhabit the project area: mountain sucker and mottled sculpin.

Mountain sucker *(Catostomus platyrhynchus)*

The mountain sucker is widely distributed throughout the western United States and Canada. It prefers clear, cold creeks and small- to medium-sized rivers with clear rubble, gravel, or sand substrate. Mountain suckers apparently favor pool-like habitats in some areas (e.g., California) and faster water in other regions (Moyle et al., 1989); however, they are rarely found in lakes. They are most abundant where there is some form of cover in the water that can provide daytime refuge. Mountain suckers spawn over gravel riffles in streams, though

the young usually inhabit weedy backwaters or slower moving water in side channels. The mountain sucker may be a sensitive indicator of native fish and invertebrate assemblages.

Mottled sculpin *(Cottus bairdii)*

The mottled sculpin is widely distributed across the United States and Canada; however, it is believed that the Green River contains a unique form of the species. The habitat preferences of this species vary geographically. Generally, its habitat is in clear, cold to warm (typically cool) headwaters, creeks, springs, small rivers, and lakes with sand and gravel or (more typically) rocky substrate. Mottled sculpin are often found under rocks or some type of vegetative cover (Scott and Crossman, 1973; Peden and Hughes, 1984; Lee et al., 1980; Page and Burr, 1991). This species spawns in the spring. The male selects a spawning site located under a flat rock or ledge, in a crevice among large gravel, among aquatic plats, or in a tunnel (Becker, 1983).

Table 3-5
Perennial Streams within the Project Area that Support or Contribute to Fisheries

Stream Name	Management Concept	Fish Species Managed	Fish Species Present
Roaring Fork Allotment			
Roaring Fork	Wild	Brook trout	Brook, cutthroat, and rainbow trout
Green River; Green River Lakes to Wagon Creek	Basic Yield	Brown trout	Brook, brown, cutthroat, and rainbow trout; Bonneville redside shiner, mottled sculpin, mountain whitefish, and speckled dace
Beaver-Twin Allotment			
Packer Creek	Basic Yield	Brook trout	Brook trout
Miner Creek	Unique Species	Colorado River cutthroat trout	Brook trout, mottled sculpin, mountain sucker
North Beaver Creek	Wild	Brook trout	Brook trout
Little Twin Creek	Wild	Brook trout	Brook, cutthroat, and rainbow trout; mottled sculpin, mountain sucker, speckled dace
Big Twin Creek	Wild	Brook trout	Brook, brown, and rainbow trout; speckled dace
Rock Creek	Unique Species	Colorado River cutthroat trout	Brook, brown, rainbow, and Colorado River cutthroat trout; speckled dace
Noble Pastures Allotment			
Tosi Creek	Wild	Brook trout	Brook, brown, rainbow, and Colorado River cutthroat trout; mottled sculpin, mountain whitefish
Klondike Creek	Unique Species	Brook trout	Brook and rainbow trout
Wagon Creek Allotment			
Wagon Creek	Wild	Brook trout	Brook, rainbow, and cutthroat trout
Upper Green River Allotment: Gypsum Creek Units			
Gypsum Creek	Wild	Brook trout	Brook cutthroat, and rainbow trout; mottled sculpin, mountain whitefish, Snake River fine spotted cutthroat trout
South Fork Gypsum Creek	Wild	Brook trout	Brook and cutthroat trout
Dago Creek			None Reported
Kendall Warm Springs	Unique Species	Kendall Warm Springs dace	Kendall Warm Springs dace
Red Creek	None	None	None Reported
Moose Creek	Wild	Brook trout	Brook trout
Jim Creek	Wild	Brook trout	Brook and rainbow trout
Green River: Wagon Creek to FS boundary	Basic Yield	Brook trout	Brook, brown, cutthroat, and rainbow trout; Bonneville redside shiner, mottled sculpin, mountain whitefish, speckled dace, fathead minnow, mountain sucker, Utah chub Bluehead Sucker, Carp, Flannalmouth Sucker

Table 3-5 (continued)
Perennial Streams within the Project Area that Support or Contribute to Fisheries

Stream Name	Management Concept	Fish Species Managed	Fish Species Present
Upper Green River Allotment: Tosi-Tepee Units			
Tosi Creek	Wild	Brook trout	Brook, brown, rainbow, and Colorado River cutthroat trout; mottled sculpin, mountain whitefish
Tepee Creek	Unique Species	Colorado River cutthroat trout	Colorado River cutthroat trout, brook trout
Red Creek	None	None	None reported
Upper Green River Allotment: Mosquito Lake Units			
Wagon Creek	Wild	Brook trout	Brook, cutthroat, and rainbow trout
Upper Green River Allotment: Mud Lake-Fish Creek Units			
Green River: Wagon Creek to FS boundary	Basic Yield	Brook trout	Brook, brown, cutthroat, rainbow, Bonneville redside shiner, mottled sculpin, mountain whitefish, speckled dace, fathead minnow, mountain sucker, Utah chub, Bluehead Sucker, Flannalmouth Sucker
Crow Creek	Wild	Brook trout	Brook Trout
Roaring Fork	Wild	Brook trout	Brook, cutthroat, and rainbow trout
South Fork Fish Creek	Wild	Snake River fine spotted cutthroat trout	Snake River fine spotted cutthroat trout, brook trout, longnose dace, mottled sculpin, mountain whitefish, speckled dace
Raspberry Creek	Wild	Snake River fine spotted cutthroat trout	Snake River fine spotted cutthroat trout
Strawberry Creek	Wild	Snake River fine spotted cutthroat trout	Snake River fine spotted cutthroat trout, brook trout, paiute sculpin
Upper Green River Livestock Driveway			
Green River: Wagon Creek to FS boundary	Basic Yield	Brook trout	Brook, brown, cutthroat, and rainbow trout; Bonneville redside shiner, mottled sculpin, mountain whitefish, speckled dace, fathead minnow, mountain sucker, Utah chub Bluehead Sucker, Flannalmouth Sucker

Source: WGFD Stream/Lake Database 2000

Protection of Aquatic Habitats

The Forest Plan provides direction for managing fisheries resources on the Bridger-Teton National Forest. This direction comes in the form of land management goals and objectives and standards and guidelines for resource protection. Forest-wide standards and guidelines applicable to this project are discussed in more detail in Chapter 2 of this document (under "Items Common to All Alternatives"), and a complete list of all Forest-wide standards and

guidelines can be found in Chapter 4 of the Forest Plan (pp. 121-145). The following standards and guidelines apply to this analysis of the fisheries resource:

- Sensitive Species Management Standard
- Fish Habitat Management Guideline
- Streambank Stability Guideline
- Restoring Stream Channel Conditions Guideline

Aquatic Health Indicators

Streams of primary concern are those located in or near the project area that may be affected directly, indirectly, or cumulatively as a result of implementation of the proposed action or one of the alternatives. Stream inventory data collected from 1990 to the present indicates that past management actions (including livestock grazing, logging, road building, and water diversion for irrigation in the project area) have resulted in the alteration and fragmentation of fish habitat.

Following are discussions of the aquatic health indicators used to evaluate existing conditions, compare the alternatives, develop mitigation measures, and identify potential direct, indirect, and cumulative effects that may result from implementation of the proposed action or alternatives.

Amount of Fine Sediment in Spawning Areas

This indicator is directly related to the production and population health of salmonids. Higher percentages of fine sediment in spawning gravels result in lower survival rates for embryo and juvenile salmonids. Survival is significantly impacted when the amount of fine sediment in spawning gravels exceeds 20 percent (Chapman and McLeod, 1987; Tappel and Bjornn, 1983; Irving and Bjornn, 1984). The Hydrology section of this chapter contains stream bottom composition descriptions for streams in the project area.

Streambank Stability

This indicator is used to measure water quality and channel stability. Generally, high sediment loads and a loss of pool and cover habitat are associated with high percentages of streambank instability. Forest Plan guidelines recommend maintaining at least 90 percent of the natural streambank stability.

Stream Width-to-depth Ratio

This indicator is used to measure channel stability and quality of fish habitat. High channel width-to-depth ratios are indicative of channels that provide little cover, contain fewer pools, and have shallow pools containing higher levels of sediment.

Pool Frequency

This indicator measures habitat complexity and the salmonid production. Generally, higher salmonid productivity is associated with greater numbers of pools. Deep, complex (containing wood and bank and root vegetation) pools provide summer and winter habitat for all life stages. Measurement of pool frequency varies by stream type and bankfull width.

Methods Used to Describe Existing Conditions

In the following section ("Project Area Allotments: Existing Conditions"), several methods have been used to describe the existing condition of aquatic resources in the project area and identify critical stream segments. These methods include identifying stream segments or reaches that are sensitive to livestock disturbance, describing the results of stream survey field data, and projecting which areas domestic cattle are expected to use.

Sensitive Streams

For these purposes, sensitive stream reaches were defined as streams:

- with low gradient channels where slope is less than, or equal to, three percent;
- within non-forested areas.

Table 3-6
Sensitive Stream Segments in the Project Area

Allotment or Pasture Name	Miles of Sensitive Stream
Roaring Fork Allotment	5.7
Beaver-Twin Allotment	12.0
Noble Pastures Allotment	1.5
Badger Creek Allotment	5.0
Upper Green River Allotment by Pasture	
Gypsum Creek Unit: Upper Pasture	5.6
Gypsum Creek Unit: Lower Pasture	5.7
Mud Lake-Fish Creek Unit: Mud Lake East Pasture	3.4
Mud Lake-Fish Creek Unit: Mud Lake West Pasture	3.4
Mud Lake-Fish Creek Unit: Fish Creek Pasture*	26.9
Mosquito Lake Unit: SE Pasture	1.2
Mosquito Lake Unit: SW Pasture*	0.7
Mosquito Lake Unit: NW Pasture*	9.4
Mosquito Lake Unit: NE Pasture*	3.0
Tosi-Tepee Unit: Lower Tosi Pasture	2.6
Tosi-Tepee Unit: Upper Tepee Pasture	5.5
Tosi-Tepee Unit: Lower Tepee Pasture	5.5
Upper Green River Driveway	10.5

The aquatic habitat conditions in sensitive stream segments are further described using stream inventory data collected in the field. In order to focus Inventory efforts on sensitive stream reaches within the project area, a livestock use model was developed to determine where livestock might be prone to congregation. The expected-use model (shown below in Table 3-7) was used to predict the areas of potential livestock congregation. This model considered the landscape features that govern the expected congregation locations of domestic cattle on rangelands without active management (Guenther et al., 2000). These physical landscape features included the distance to water, type of vegetation, and slope of

the area. The expected-use model classified expected livestock use in a given area from incidental to high. Since active herding takes place on the grazing lands within the project area this model represents a worst case scenario.

Table 3-7
Expected-Use Matrix for Free-Ranging Domestic Cattle

Expected-Use (EU) Class	Percent Slope	Distance to Water	Vegetation Types
High (EU1)	0 to 6	0 to 250 yards	Shrubland, Herbland, Riparian, Wet Meadow
Moderate (EU2)	0 to 6	250 yards to 1 mile	
Moderate (EU3)	6 to 33	0 to 250 yards	
Low (EU4)	6 to 33	250 yards to 1 mile	
Incidental (EU5)	0 to 6	1 to 2 miles	
Incidental (EU6)	33 to 60	250 yards to 1 miles	
Incidental	33 to 60	1 to 2 miles	

Table 3-8
Expected-Use (EU) Acres for Allotments and Pastures in the Project Area (Assumes No Herding)

Allotment/Pasture Name	Acres of High EU Class (EU1)	Acres of Combined High and Moderate EU Classes (EU1, 2, 3)
Roaring Fork Allotment	780	1,855
Beaver-Twin Allotment	917	3,459
Noble Pastures Allotment	760	760
Badger Creek Allotment	239	621
Upper Green River Allotment by Pasture		
Gypsum Creek Unit: Upper Pasture	1,411	3,605
Gypsum Creek Unit: Lower Pasture	299	1,671
Mud Lake-Fish Creek Unit: Mud Lake East Pasture	673	2,021
Mud Lake-Fish Creek Unit: Mud Lake West Pasture	1,090	3,341
Mud Lake-Fish Creek Unit: Fish Creek Pasture	5,508	12,342
Mosquito Lake Unit: SE Pasture	197	1,282
Mosquito Lake Unit: SW Pasture	1,444	2,188
Mosquito Lake Unit: NW Pasture	1,998	2,985
Mosquito Lake Unit: NE Pasture	894	1,848
Tosi-Tepee Unit: Lower Tosi Pasture	100	379
Tosi-Tepee Unit: Upper Tepee Pasture	248	1,114
Tosi-Tepee Unit: Lower Tepee Pasture	743	1,949
Upper Green River Driveway	1,495	3,704

Focal stream segments were designated by identifying areas where sensitive stream segments overlap with high expected-use areas. Field survey data was then used to verify these focal stream reaches and identify other stream segments of concern. When available, reference stream reaches (those stream segments that are substantially unaltered by management) are included for comparison in the descriptions below. Some of the focal stream reaches have been refined into focal areas which are identified by pasture below.

The definition of a critical area is; an area in need of special management consideration due to their unique characteristics or their unique sensitivity to disturbance. They are areas that do not currently meet desired future conditions for one or more resource area. Critical areas are different from key areas because they aren't intended to represent a larger area or to sensitive to changes in single management action. The causative factors may or may not be easy to identify. Generally, it is difficult or impossible to quantify the role that each causative factor plays in retarding attainment of desired future conditions.

Project Area Allotments: Existing Conditions

Roaring Fork Allotment

Expected-use model outputs indicate that without active herding there are 780 acres of high expected-use area and 1,075 acres of moderate expected-use area along Roaring Fork Creek and the Green River.

There are 5.7 miles of sensitive stream segments along Roaring Fork Creek and the Green River in this allotment. Stream surveys were conducted on Roaring Fork Creek in 2001. Brook and rainbow trout were observed during these habitat surveys, and the survey report noted two areas of concern: the Roaring Fork basin and Roaring Fork Creek at the western allotment boundary. Damage caused by streambank trampling was reported in both of these focal areas. Channel characteristics met Forest Plan guidelines for most criteria. However, the stream survey report noted that streambank stability was lower than expected and width-to-depth ratios were higher than expected. Past livestock grazing was identified as a probable contributor to these conditions. To meet Forest Plan Guidelines and Desired Future Conditions (DFC's), 90 percent of natural streambank stability would have to be achieved. Table 3-9 displays the channel characteristics of Roaring Fork Creek in 2001.

Table 3-9
Channel Characteristics of Roaring Fork Creek (2001)

Reach Number	Percentage of Surface Fines (pebble count)	Percentage of Stable Streambank	Number of Pools (per mile)	Bankfull Width (in feet)
Reach 1	17	65	6	15.6
Reach 2	11	79	80	10.9
Reach 3	12	82	64	9.8

Beaver-Twin Allotment

Season-long (July 15th to October 15th) grazing of 662 cow/calf pairs and 33 bulls is permitted in the Beaver-Twin allotment. As there are no designated pastures, the cattle range over the entire allotment during the season of use. Expected-use model outputs indicate that there are 917 acres of high expected-use area and 2,542 acres of moderate expected-use area in the allotment.

There are 12.0 miles of sensitive stream segments identified within this allotment.. Stream surveys conducted in the Beaver-Twin allotment in 1989 included portions of Rock, Miner, Packer, North Beaver, Little Twin, and Big Twin creeks. At that time, stream surveys only classified channel stability and fish habitat quality; comprehensive data was not collected for stream channel characteristics or fish habitat conditions. The sensitive stream segments were the areas of concern noted in the stream inventory reports.

Rock Creek is the only stream within the allotment that contains Colorado River cutthroat trout (a Sensitive species). The survey report indicated that high sediment loads and unstable banks were present in the upper reaches of the low gradient stream channel in this stream. However, livestock trampling was not the reported cause of the streambank damage or the high sediment loads, and the overall channel stability ratings were fair to excellent. Three stream segments of unstable channel are considered focal areas for aquatic resources.

Colorado River cutthroat trout were introduced into Miner Creek in 1982, and they were observed during the 1989 stream inventory. However, none were recaptured during subsequent fish sampling conducted by WGFD in the mid-1990's (brook trout were present). The 1989 fish habitat inventory indicated that Miner Creek was in fair to good condition, with the most sensitive stream segments located near the headwaters.

The Packer Creek stream assessment report indicated that two channel segments were in poor condition, with low streambank stability and a high percentage of surface fines in the stream-bottom gravels. Photographs suggested that cattle trampling on the streambanks may contribute to the poor channel condition.. These two stream segments of unstable channel are considered focal areas for aquatic resources.

The North Beaver Creek stream assessment report indicated that both habitat and channel stability were in fair to excellent condition. Impacts on the stream were noted in four locations. These included two water irrigation diversions that potentially de-water the main channel and two road crossings where channel damage had occurred. The stream segment of potentially unstable channel is considered a focal area for aquatic resources.

The Little Twin Creek stream assessment report indicated that the majority of the stream channel condition was in fair, or better, condition. Two channel segments were in poor condition, with low streambank stability and a high percentage of surface fines in the stream-bottom gravels. Both damaged stream segments occurred at trail crossings where the channel sensitivity was considered high due to the type of soil found at those sites. Recreational trail use and livestock congregation were the reported causes of the stream damage. The stream

segment at the Little Twin Creek trail crossing is considered a focal area for aquatic resources.

A sensitive stream channel and a high rate of bank failure were observed on Big Twin Creek, from the southern allotment boundary, through the Twin Creek Basin, and upstream to the trail crossing. Although much of the bank failure resulted from natural causes (a channel meander cutting through old beaver pond deposits), the survey report recommended minimizing disturbance on the streambanks. Two focal areas for aquatic resources are located on Big Twin Creek in the allotment

To meet Forest Plan Guidelines and Desired Future Conditions (DFC's), 90 percent natural streambank stability would have to be achieved on all focal stream segments identified in the Beaver-Twin Creeks allotment.

Noble Pastures Allotment

June 15th through September 20th grazing of 314 cow/calf pairs and 110 yearlings is permitted in the Noble Pastures allotment. Four irrigated pastures are intensively managed under a rotation system. Each of the four pastures is grazed every year under a rotation schedule that allows for periodic rest during the course of the growing season, but no season-long rest for any one pasture. Tosi and Klondike creeks serve as the water sources for flood irrigation of the four pastures.

Expected-use model outputs indicate that there are 422 acres of high expected-use area and 307 acres of moderate expected-use area in the allotment (Figure 4). However, due to the unique situation created by irrigated pastures, intensive management, and flat topography, the entire allotment area is considered to be in the high expected-use class.

The entire lengths (1.5 miles total) of Tosi and Klondike creeks within the allotment are considered sensitive stream segments. Klondike Creek has been fenced and excluded from livestock grazing since 1985. The stream channel presently meanders through a meadow without willows that is dominated by wet sedge. Recovery from past degradation appears to be complete. The Tosi Creek channel has not been excluded from livestock grazing. A stream survey reported streambank stability of 52 percent and evident livestock trampling. Table 3-10 displays the 1990 channel characteristics of Tosi and Klondike creeks.

Table 3-10
Channel Characteristics of Tosi and Klondike Creeks within the Noble Pastures Allotment (1990)

Stream	Percentage of Surface Fines (pebble count)	Actual Percentage of Stable Streambank	Number of Pools (per mile)	Bankfull Width (in feet)
Klondike Creek*	17	95	63	5.7
Tosi Creek	31	52	21	Not Recorded

*Klondike Creek stream channel conditions reflect those not influenced by human activities. They are provided for comparison.

Since 1994, the allotment manager has voluntarily implemented a 6-inch stubble height standard for vegetation along streambanks and a minimal trampling standard. When streambank vegetation is grazed close to a 6-inch stubble height, or when streambank trampling becomes apparent, livestock are moved out of the pasture. Observation indicates that streambank stability has noticeably improved on this portion of Tosi Creek over the past five years; however, no data has been collected to support this observation. The portion of Tosi Creek that flows through the Noble Pastures allotment is considered a focal area.

Badger Creek Allotment

Season-long (July 16th to October 15th) grazing of 157 cow/calf pairs is permitted in the Badger Creek allotment. As there are no designated pastures, the cattle range over the entire allotment during the season of use. Expected-use model outputs indicate that there are 239 acres of high expected-use area and 382 acres of moderate expected-use area within the allotment .

There are 5.0 miles of sensitive stream segments identified within the Badger Creek allotment. Big Twin Creek is the primary stream within the allotment. The allotment also includes the lower reaches of Big Twin Creek, Ole Cabin Creek (a tributary to Big Twin), 200 feet of lower Little Twin Creek, and an unnamed tributary to Rock Creek (located in Sawmill Park). A 1989 stream survey conducted on Big Twin Creek identified a sensitive stream channel and high rate of bank failure from its confluence with Ole Cabin Creek for one-half mile downstream, and from the allotment boundary downstream for one-half mile. Although much of the bank failure resulted from natural causes (a. channel meander cutting through old beaver pond deposits), the survey report recommended minimizing disturbance to streambanks. These two stream segments (and their associated riparian areas) are identified as focal areas for aquatic resources. Aquatic and channel conditions in the remaining sensitive stream segments have not been analyzed.

Wagon Creek Allotment

Deferred rotation grazing of 26 cow/calf pairs is permitted from July 15th to October 15th within the Wagon Creek allotment. Three designated pastures, two of which are located on private land, comprise the allotment. The rotation schedule allows up to 52 cow/calf pairs to graze the Forest Service pasture for up to 45 days during the entire season of use. Expected-use model outputs indicate that there are 113 acres of high expected-use area and 46 acres of moderate expected-use area within the allotment.

The Wagon Creek allotment includes the lower reaches of Wagon Creek and the Green River, and 1.4 miles of sensitive stream segments have been identified within the allotment boundaries. Wagon Creek is the major stream, flowing through 1.3 miles of the allotment. A 2001 stream survey conducted on Wagon Creek identified a sensitive stream channel segment from its confluence with the Green River to the northern allotment boundary. Stream channel sediment deposits in the low gradient segment of Wagon Creek (through the Green River floodplain), and the presence of beaver ponds, makes this area extremely sensitive to disturbance. The high amount of fine sediment covering the stream bottom throughout the reach was attributed to upstream channel disturbances. Although this portion of Wagon Creek showed signs of grazing and some streambank trampling, the channel disturbance caused by livestock was within acceptable limits. The Wagon Creek stream segment (and its associated riparian area) is designated as a focal area for aquatic resources.

Upper Green River Allotment

The Upper Green River allotment is a combination of four separate units—Gypsum Creek, Mud-Fish Creek, Mosquito Lake, and Tosi-Tepee—each with its own pasture rotation system and timing. The units share a common driveway along the Green River for moving livestock. The total number of permitted livestock for the four units is 7,600 cow/calf pairs.

The livestock grazing permit holders for this allotment began voluntary vegetation and utilization monitoring of riparian vegetation in 1997, under the direction of Forest Service range conservationists. Post-season grazing height measurements of *Carex sp*. (water sedge) were taken along Tepee Creek, Wagon Creek, Gypsum Creek, and Fish Creek The results of this monitoring suggested that streamside utilization by domestic livestock was not occurring at levels that would cause deterioration of the stream channels. Generally, *Carex sp.* median height measurements of 4 to 6 inches are sufficient to prevent further deterioration of streambanks and associated channel characteristics (Cleary, 2000). However, photographs taken at the same locations indicate that continued trampling of streambanks is preventing complete recovery of historically damaged stream segments.

Gypsum Creek Unit

Deferred rotation grazing of 2,000 cow/calf pairs is permitted from June 16th to October 15th in the Gypsum Creek unit. The unit is divided into two pastures: Upper Pasture and Lower Pasture. The rotation schedule allows for 61 days of use on each. However, the Allotment Management Plan (AMP) allows for drift of cattle both on and off the allotment; therefore, the actual time on the allotment (used for calculating livestock density in expected-use areas and on sensitive stream segments) was reduced by 16 days. Expected-use model outputs indicate that there are 1,411 acres

of high expected-use area and 2,194 acres of moderate expected-use area in Upper Pasture. Expected-use model outputs for Lower Pasture indicate that there are 299 acres of high expected-use area and 1,372 acres of moderate expected-use area.

There are 11.3 miles of sensitive stream segments within the unit. Streams in Upper Pasture include the east bank of the Green River, Moose Creek, and upper Gypsum Creek. Streams in Lower Pasture include the east bank of the Green River, the lower half of Gypsum Creek, South Fork Gypsum Creek, Dago Creek, Jim Creek, Red Creek, and Kendall Warm Springs. Gypsum Creek is the major stream within the unit. Surveys of the lower segment of South Fork Gypsum Creek and half the stream length within Lower Pasture were completed in 1994. However, the areas surveyed did not include stream segments that are highly sensitive to livestock grazing; therefore, the survey results did not adequately describe existing conditions in the areas of concern. Identification of focal stream segments (and their associated riparian areas) was accomplished by using maps and local knowledge of the unit.

Mud Lake-Fish Creek Unit

Deferred rotation grazing of 2,800 cow/calf pairs is permitted from June 16th to October 15th in the Mud Lake-Fish Creek Unit. The unit is divided into three pastures: Mud Lake East, Mud Lake West, and Fish Creek. The rotation schedule allows for 62 days of use on the Fish Creek pasture and the 30 days of use within each of the Mud Lake pastures annually.

Mud Lake East Pasture

Expected-use model outputs indicate that there are 673 acres of high expected-use area and 1,348 acres of moderate expected-use area in this pasture. There are 3.4 miles of sensitive stream segments identified within the pasture. Streams in the Mud Lake East pasture include the north bank of the Green River, lower Roaring Fork Creek, and the east fork of Crow Creek. A 2001 stream survey conducted on Roaring Fork Creek identified sensitive stream channel segments at its confluence with the Green River and at the eastern allotment boundary. Stream habitat features included low streambank stability and a high percentage of surface fines covering gravels.

Table 3-11
Channel Characteristics of Roaring Fork Creek within the Mud Lake East Pasture (2001)

Stream	Percentage of Surface Fines (pebble count)	Percentage of Stable Streambank	Number of Pools (per mile)	Bankfull Width (in feet)
Roaring Fork	49	76	10	55

Stream channel sediment deposits in the low gradient segment of Roaring Fork Creek (through the Green River floodplain) make this area extremely sensitive to disturbance. The high amount of fine sediment covering the stream bottom

throughout the reach was attributed to eroding banks and upstream channel disturbances. Sensitive stream segments on the east fork of Crow Creek and the Green River were not surveyed. The sensitive stream segments on Roaring Fork and Crow creeks were identified as focal areas for aquatic resources.

Mud Lake West Pasture
Expected-use model outputs indicate that there are 1,090 acres of high expected-use area and 2,251 acres of moderate expected-use area in this pasture.

There are 3.4 miles of sensitive stream segments identified within the pasture. Streams in the Mud Lake West pasture include Crow Creek and Sidewinder Creek (a tributary to Wagon Creek). A stream survey conducted on Sidewinder Creek in 1992 identified damaged stream channel segments at its confluence with Wagon Creek and upstream on Sidewinder Creek for approximately one-quarter mile. Stream habitat features included low streambank stability, a high percentage of surface fines covering gravels, and pool filling. Stream channel data was not collected during the survey. The high amount of fine sediment covering the stream bottom throughout reach was attributed to eroding banks and upstream channel disturbances. The sensitive stream segments and associated riparian areas on Sidewinder and Crow creeks were identified as focal areas for aquatic resources.

Fish Creek Pasture
Expected-use model outputs indicate that there are 5,508 acres of high expected-use area and 6,834 acres of moderate expected-use area in this pasture.

There are 26.9 miles of sensitive stream segments within the pasture. Streams in the Fish Creek pasture include South Fork Fish Creek, and Raspberry and Strawberry creeks. These streams contain Snake River fine-spotted and Yellowstone cutthroat trout (Sensitive species). Stream surveys were conducted on South Fork Fish, Raspberry, and Strawberry creeks from 1999 through 2000. Streambank stability estimates ranging from 15 to 95 percent were recorded during these surveys. The overall streambank stability on Raspberry and Strawberry creeks was 80 percent, while streambank stability on South Fork Fish Creek ranged from 15 to 95 percent. The channel segments with the lowest streambank stability percentages occurred on South Fork Fish Creek through Fish Creek Park and Ryan Park. High percentages of surface fines covering gravels and pool filling were also noted within these same stream segments. This condition was attributed to eroding banks and roads in the area. Three sensitive stream segments (and their associated riparian areas) on South Fork Fish Creek, and one on Strawberry Creek, were identified as focal areas for aquatic resources.

Mosquito Lake Unit
Rest rotation grazing of 1,800 cow/calf pairs is permitted from June 16th to October 15th in the Mosquito Lake Unit. The unit is divided into four pastures: Mosquito Lake SE, Mosquito Lake SW, Mosquito Lake NW, and Mosquito Lake NE. The rest rotation schedule allows 41 days of use per grazing season in each of three pastures.

One pasture is rested each year in rotation. Numerous perennial ponds and wetlands provide water for livestock within the Mosquito Lake SW, NW, and NE pastures, reducing the congregation effect along streams.

Table 3-12
Channel Characteristics of Wagon Creek within the Mosquito Lake Unit Pastures (2001)

Pasture	Percentage of Surface Fines (pebble count)	Percentage of Stable Streambank	Number of Pools (per mile)	Bankfull Width (in feet)
Mosquito SE	51	55	Not Recorded	31
Mosquito SW	Not recorded	Not Recorded	Not Recorded	Not Recorded
Mosquito NW	15-95	58	17.5	7.8
Mosquito NE	38	69	NR	21

Mosquito Lake SE Pasture
Expected-use model outputs indicate that there are 197 acres of high expected-use area and 1,085 acres of moderate expected-use area within this pasture.

There are 1.2 miles of sensitive stream segments within the pasture. Wagon Creek flows through the Mosquito Lake SE pasture. A 2001 stream survey conducted on Wagon Creek identified sensitive stream channel segments in the northwestern corner of pasture. Low streambank stability, a high percentage of surface fines covering gravels, and loss of pool habitat (caused by sediment accumulating in pools and increased stream width) were observed during the stream habitat survey. This area is extremely sensitive to disturbance, due to the type of soil present and the lack of willow growth along the streambanks. The high percentage of fine sediment covering the stream bottom throughout reach was attributed to eroding banks and upstream channel disturbances. The upper mile of Wagon Creek (and the associated riparian area) was identified as a focal area for aquatic resources.

Mosquito Lake SW Pasture
Expected-use model outputs indicate that there are 1,444 acres of high expected-use area and 744 acres of moderate expected-use area within this pasture.

There are 0.7 miles of sensitive stream segments within the pasture. Streams within the pasture include small headwater streams to Wagon Creek. No stream surveys have been conducted on these streams. One segment of Wagon Creek (and its associated riparian area) has been identified as a focal area for aquatic resources.

Mosquito Lake NW Pasture
Expected-use model outputs indicate that there are 1,998 acres of high expected-use area and 987 acres of moderate expected-use area within this pasture.

There are 9.4 miles of sensitive stream segments in the pasture. These streams are the headwaters of Wagon Creek. Four sensitive stream segments were surveyed in 2001, and damage caused by livestock was noted in all four. Low streambank stability, high percentages of surface fines covering gravels, and loss of pool habitat (caused by sediment accumulating in pools and increased stream width) were observed during the stream habitat surveys. This area is extremely sensitive to disturbance, due to the type of soil present and lack of willow growth along the streambanks. Three sensitive stream segments (and their associated riparian areas) have been identified as focal areas for aquatic resources.

Mosquito Lake NE Pasture
Expected-use model outputs indicate that there are 894 acres of high expected-use area and 954 acres of moderate expected-use area within this pasture.

There are 3.0 miles of sensitive stream segments within the pasture. Streams within the Mosquito Lake NE pasture include South Fork Fish, Raspberry, and Strawberry creeks. The main channel of Wagon Creek also bisects the southwestern corner of this pasture, and several small headwater streams of Wagon Creek drain the numerous ponds within the pasture. The primary Wagon Creek channel was surveyed and showed signs of livestock damage. Low streambank stability, a high percentage of surface fines covering gravels, and loss of pool habitat (caused by sediment accumulating in pools and increased stream width) were observed during the stream habitat survey. (After one season of rest, channel conditions improved dramatically.) This area is extremely sensitive to disturbance, due to the type of soil present and lack of willow growth along the streambanks. Two sensitive stream segments (and their associated riparian areas) have been identified as focal areas for aquatic resources.

Tosi-Tepee Unit
Rotation grazing of 1,000 cow/calf pairs is permitted from June 16th to October 15th within the Tosi-Tepee unit. The unit is divided into three pastures: Lower Tosi, Upper Tepee, and Lower Tepee. The rotation schedule allows 30 days of use in the Lower Tosi pasture, and 46 days each on the Upper and Lower Tepee pastures.

Table 3-13
Channel Characteristics of Tosi and Tepee Creeks within the Tosi-Tepee Unit Pastures (1990-1991)

Pasture (Stream & Reach)	Percentage of Surface Fines (pebble count)	Percentage of Stable Streambank*	Number of Pools (per mile)	Bankfull Width (in feet)
Lower Tosi (Tosi Creek)	15	82	51	27
Upper Tepee (Tosi Creek)	19	65	51	25
Upper Tepee (Tepee Cr. Reach 4)	25	73, 45	44	24
Upper Tepee (Tepee Cr. Reach 5)	30	78, 48	58	17.3
Lower Tepee (Tepee Cr. Reach 1)	9	95, 93	82	13.4
Lower Tepee (Tepee Cr. Reach 2)	13	85, 97	103	11.8
Lower Tepee (Tepee Cr. Reach 3a)	10	72, 86	88	10.7
Lower Tepee (Tepee Cr. Reach 3b)	27	88, 55	46	12.5
Lower Tepee (Tepee Cr. Reach 4)	18.7	86, 45	58	18.2

*Streambank stability and width-to-depth ratios on Tepee Creek were re-sampled in 1997. 1991 measurements are displayed first.

Lower Tosi Pasture
Expected-use model outputs indicate that there are 100 acres of high expected-use area and 279 acres of moderate expected-use area within this pasture.

There are 2.6 miles of sensitive stream segments in the pasture. Lower Tepee Creek is the major stream within the Lower Tosi pasture. Moderate streambank stability, low percentages of surface fines covering gravels, and a possible loss of pool habitat caused by sediment filling pools were observed during stream surveys. Small stream segments are sensitive to disturbance, due to the type of soil present and lack of willow growth along streambanks; however, the overall stream condition was considered fair. One sensitive stream segment (and its associated riparian area) was identified as a focal area for aquatic resources.

Upper Tepee Pasture
Expected-use model outputs indicate that there are 248 acres of high expected-use area and 865 acres of moderate expected-use area within this pasture.

There are 5.5 miles of sensitive stream segments within the pasture. Streams within the Upper Tepee pasture include Upper Tosi and Tepee creeks. Low percentages of streambank stability, moderate to high percentages of surface fines covering gravels, possible losses of pool habitat caused by sediment filling pools, and increased stream widths were observed on both streams (Table 3-13). Tosi Creek is considered moderately sensitive to disturbance, due to the type of soil present and lack of willow growth along the streambanks. Upper Tepee Creek is considered highly sensitive and contains a population of Colorado River cutthroat trout (a Sensitive species). Two sensitive stream segments (and their associated riparian areas) have been identified as focal areas for aquatic resources.

Lower Tepee Pasture

Expected-use model outputs indicate that there are 743 acres of high expected-use area and 1,206 acres of moderate expected-use area within this pasture.

There are 5.5 miles of sensitive stream segments along Tepee Creek within the pasture. The upper reaches of Tepee Creek contain a population of Colorado River cutthroat trout (a Sensitive species). Moderate streambank stability, a high percentage of surface fines covering gravels, and a possible loss of pool habitat, caused by sediment filling pools and increased stream width were observed during stream surveys. The upper reaches of Tepee Creek are extremely sensitive to disturbance, due to the type of soil present and a lack of willow growth along the streambanks. The lower reaches are less sensitive to disturbance, due to increased stream gradient, presence of willows, and less erosive soil types. One sensitive stream segments (and its associated riparian area) is identified as a focal area for aquatic resources.

Upper Green River Driveway

The Upper Green River (all four units), Wagon Creek, Roaring Fork, and Noble Pastures allotments share a common driveway along the Green River for moving livestock to and from the various allotments and pasture units. The total number of livestock permitted within the driveway is 8,110 cow/calf pairs and 110 yearlings. The grazing scheme is essentially rotation grazing in the spring and fall of each year from June 15th to October 15th. Spring cattle drives move livestock rapidly through the driveway, with little time allowed for grazing. In the fall, cattle are allowed to drift out and spend additional time grazing within the driveway. The number of cattle drives increase as October 15th approaches.

Expected-use model outputs indicate that there are 743 acres of high expected-use area and 1,206 acres of moderate expected-use area within the driveway.
There are 10.5 miles of sensitive stream segments along the driveway. Streams in the area include the Green River, Kendall Warm Springs, and the lower portions of Rock, Lime, Whiskey, Tepee, and Tosi creeks, where these streams enter the Green River. Based upon the expected-use model and the identified sensitive stream segments, three stream segments (and their associated riparian areas) along the Green River, Tepee Creek, and Lime Creek have been identified as focal areas for aquatic resources.

HYDROLOGY

The following discussions and analyses are based on the (Hydrology Resources Report for the Upper Green River Area Rangeland Project Decision. Applicable direction for hydrology and associated processes is also contained in Chapter 4 of the Forest Plan (p. 133).

Desired Future Condition

Maintain the resiliency of stream morphology, sediment yields, and flow regimes to natural and human-caused disturbances.

Existing Condition

The project area encompasses the headwaters of both the Green River drainage of the Colorado River System and the Gros Ventre River drainage of the Snake/Columbia River Basin System. Elevations in the project area range from approximately 7,700 to 11,600 feet. The average annual precipitation ranges from 16 inches (at lower elevations) to 24 inches (at higher elevations). Winter snowfall and summer rains associated with thunderstorms account for the majority of the precipitation that falls in the project area. Maps showing the project area location and allotments are displayed in Chapter 1 (Figures 1-1 and 1-2).

According to the Bridger-Teton National Forest (BTNF) GIS database, there are 265 miles of intermittent streams and 237 miles of perennial streams in the project area. The major rivers and streams include: the Upper Green River, Big and Little Twin creeks, North Beaver Creek, Rock Creek, Wagon Creek, Tosi Creek, Tepee Creek, Roaring Fork Creek, Gypsum Creek, Crow Creek, South Fork Fish Creek, and Kinky Creek. None of the streams in the project area are listed on the State of Wyoming 303(d) (Water Bodies with Water Quality Impairments) list. Approximately 10 percent of the project area is composed of riparian vegetation, according to the GIS database. Table 3-14 displays the percentage of riparian vegetation found in each allotment.

Table 3-14
Riparian Vegetation Composition by Allotment

Allotment Name	Percentage of Allotment Composed of Riparian Vegetation
Roaring Fork Allotment	6 percent
Beaver-Twin Allotment	5 percent
Noble Pastures	75 percent
Badger Creek Allotment	6 percent
Wagon Creek Allotment	43 percent
Upper Green River Allotment: Gypsum Creek Unit	8 percent
Upper Green River Allotment: Mud-Fish Creek Unit	12 percent
Upper Green River Allotment: Mosquito Lake Unit	17 percent
Upper Green River Allotment: Tosi-Tepee Unit	5 percent
Upper Green River Driveway	17 percent

Data Collection and Results

Aquatic Data

Aquatic data was collected in 21 critical areas and on one reference stream during the 2002 field season. This data included stream channel parameters (e.g., width-to-depth ratios, percentage of channel surface fines, and percentages of streambank stability and disturbance). Photo points were also established for the critical areas. The critical areas listed were established by the ID Team primarily within the focal areas described in the Fisheries sections

The definition of a critical area is; an area in need of special management consideration due to their unique characteristics or their unique sensitivity to disturbance. They are areas that do not currently meet desired future conditions for one or more resource area. Critical areas are different from key areas because they aren't intended to represent a larger area or to sensitive to changes in single management action. The causative factors may or may not be easy to identify. Generally, it is difficult or impossible to quantify the role that each causative factor plays in retarding attainment of desired future conditions.

Four of the 21 critical areas (19 percent) met, the Forest Plan Streambank Stability Guideline that recommends maintaining 90 percent of the natural streambank stability. Table 3-15 summarizes the aquatic data collected in critical areas of the project area during the 2002 field season. Aquatic data collected on Clear Creek is included in the table for comparison. Clear Creek, a tributary to the Green River, is located outside the project area in the Bridger Wilderness. As little livestock grazing has taken place near this stream, it was selected for use a reference stream. There are a wide range of soil and geologic types within the project area and Clear Creek is located upon one of the most stable types for natural streambank stability, this makes its use a conservative estimate of natural conditions.

Table 3-15
2002 Aquatic Data Collected in Critical Areas of the Project Area

Allotment	Pasture	Creek	Critical Area Sample Number	Percentage of Natural Streambank Stability*	Comment
REFERENCE STREAM	**None**	**Clear Creek**	**1**	91(actual measurement)	**Reference reach**
Beaver-Twin	None	Big Twin	5	75	
Beaver-Twin	None	Little Twin	10	82	
Beaver-Twin	None	North Beaver	8	100	
Beaver-Twin	None	Rock	--	--	Not Sampled
Badger Creek	None	Big Twin	12	77	
Wagon Creek	None	Wagon	20	55	
Noble Pastures	Number 1	Tosi	9	54	
Roaring Fork	None	Roaring Fork	2	75	
Upper Green: Gypsum Unit	Lower	Gypsum	14	70	
Upper Green: Gypsum Unit	Upper	Gypsum	17	74	
Upper Green: Mosquito Unit	NE Pasture	Wagon	21	40	
Upper Green: Mosquito Unit	NW Pasture	Wagon	16	70	
Upper Green: Mosquito Unit	SE Pasture	Wagon	15	46	
Upper Green: Mud-Fish Unit	Mud Lk. East	Roaring Fork	7	97	
Upper Green: Mud-Fish Unit	Mud Lk. West	Crow Creek	4	100	
Upper Green: Mud-Fish Unit	Fish Creek	S. Fork Fish	18	53	
Upper Green: Mud-Fish Unit	Fish Creek	S. Fork Fish	13	64	
Upper Green:: Tepee-Tosi Unit	Upper Tepee	Tepee	19	42	above enclosure
Upper Green: Tepee-Tosi Unit	Upper Tepee	Tepee	3	82	within enclosure
Upper Green: Tepee-Tosi Unit	Upper Tosi	Tepee	6	62	
Upper Green: Tepee-Tosi Unit	Lower Tosi	Tosi	11	70	
Upper Green: Tepee-Tosi Unit	Kinky	Kinky	22	99	Low cumulative

*Numbers based upon using Clear Creek as the natural condition.

Ground Cover Data

Ground cover data was collected in key areas of the project area from 1992 through 1995. Additional data was collected during the 2002 field season. Key areas are sites in an

allotment that represent the general range conditions in that area. A key area guides the general management of the entire area of which it is a part, and will reflect the over all acceptability of the current grazing management over the range.

Upland sites accounted for 66 percent of key areas in the project area, while the remaining 34 percent were willow or riparian sites. The vegetation present at these sites included sage/grass, willow, tall forb, and riparian types. Ground cover standards are listed in the Rocky Mountain Research Station Report, "Indicators of Rangeland Health and Functionality in the Intermountain West." These standards include maintaining sagebrush/grass vegetation types at 85 percent and tall forb vegetation at 80 percent. It is generally believed that ground cover percentages for willow and riparian areas should be maintained at 95 percent. Monitoring of ground cover conditions has been conducted at 21 key sites in the project area since 1992.

Upland vegetation, in terms of watershed function as indicated by ground cover percentages, appears to be in satisfactory condition in the project area. Nineteen of the 21 sites sampled (90 percent) (at 80% probability with one degree of freedom) meet the established percentages for Properly Functioning Condition (PFC) for ground cover. Table 3-23 in the Vegetation section of this chapter summarizes ground cover readings taken at key areas in the project area between 1992 and 2002.

R1/R4 Stream Survey Data

Using R1/R4 survey techniques stream surveys or aquatic surveys were conducted on selected stream reaches within the project area. The surveys were conducted on Roaring Fork and Wagon creeks in 2001. Other aquatic habitat surveys were conducted on Rock, Big Twin, Little Twin, Miner, North Beaver, and Packer creeks in 1989, on Tosi Creek in 1992, and on Tepee Creek in 1990 and 1997. In 2001, an R1/R4 survey was also conducted on Clear Creek (located outside the project area in the Bridger Wilderness). Livestock grazing activities have occurred very little on Clear Creek; it was used as a reference stream for determining Properly Functioning Condition (PFC) Guidelines for impacted streams on the BTNF.

Watershed Condition Data

Watershed conditions are defined in Chapter 2 (p.12) of the Forest Plan. Three condition classes are used to characterize a watershed relative to its potential and tolerance:

- Class I: Watershed condition is at or above potential.
- Class II: Watershed condition is below potential but can be improved through applied management of improvement measures.
- Class III: Watershed is functioning at or below its tolerance level.

In 1999, a reconnaissance-level analysis of watershed condition was completed for the BTNF, following protocol outlined in the Inland West Watershed Initiative (IWWI). The primary goal of the IWWI is to allow the Forest Service to focus its spending on the most important watersheds and provide for the orderly management of all watersheds over time.

Results from analyses conducted under IWWI guidelines provide direction for further study and work.

The IWWI watershed condition classes are comparable to those detailed in the Forest Plan. IWWI analyses are meant to be repeated; therefore, some initial condition ratings may later prove to be incorrect. For the purposes of this assessment, the IWWI analysis provides an initial evaluation of watershed geomorphic integrity, based on available data and professional judgment. Here, geomorphic integrity reflects soil-hydrologic function as a sponge-and-filter system that absorbs and stores water. It also reflects the physical resilience of both watershed soils and stream channels. Watersheds are rated as having high, moderate, or low geomorphic integrity. Table 3-16 lists the criteria for each category

Table 3-16
Watershed Geomorphic Integrity Descriptions and Criteria

Description of Geomorphic Integrity Rating	Criteria*
High: Watershed has high soil and water integrity relative to its natural potential condition. Disturbance does not compromise soil-hydrologic function or soil-stream resilience.	• Soil-hydrologic function is estimated to be excellent or good throughout the watershed; **and** • All streams are estimated to be in dynamic equilibrium relative to their own potential; **and** • All riparian areas are estimated to be in properly functioning condition.
Moderate: The watershed has moderate soil and water integrity relative to its natural potential condition. Disturbance partly compromises soil-hydrologic function or soil-stream resilience. Recovery can occur naturally or through revised management with minimal capital investment.	• Soil-hydrologic function is estimated to be damaged in isolated areas of the watershed (i.e., less than 20 percent); **or** • A minor part of stream miles (i.e., less than 20 percent) is estimated not to be in dynamic equilibrium relative to their own potential; **or** • A minor part of riparian miles (i.e., less than 20 percent) is estimated to be in functioning-at-risk or non-functioning condition.
Low: The watershed has low soil and water integrity relative to its natural potential condition. Disturbance widely compromises soil-hydrologic function or soil-stream resilience. Recovery requires capital investments and revised management. Management must complement recovery.	• Soil-hydrologic function is estimated to be degraded over much of the watershed (i.e., more than 20 percent); **or** • A major part of stream miles (i.e., more than 20 percent) is estimated not to be in dynamic equilibrium, relative to its own potential; **or** • A major part of riparian miles (i.e., more than 20 percent) is estimated to in functioning-at-risk or non-functioning condition.

*IWWI protocol uses Dunne and Leopold's (1978) definition for dynamic equilibrium: The continual adjustment of land-and-stream forms and processes within a natural range of conditions, interrupted only by extreme disturbance (reset) events.

Table 3-17 displays the results of the IWWI analysis for the project area. These ratings should be understood as approximations of watershed conditions, based on professional judgment and limited available data. Though it is used in this document to discuss watershed

conditions, the original intent of the IWWI was to provide direction for further study and work.

Table 3-17
Inland West Watershed Initiative (IWWI) Data for the Upper Green River and Gros Ventre River Watersheds

Hydrologic unit #	Watershed Name	Ownership*	Geomorphic Integrity Rating	Data Source	Factors Contributing to Change in Geomorphic Integrity
Sub-Basin: Upper Green River					
140401011301	Little Twin Creek	BTNF, private	Moderate	Limited	Range, roads, timber
140401011302	Big Twin Creek	BTNF (W), private	Moderate	Limited	Range
140401011303	Jim Creek	BTNF (W), private	Moderate	Limited	Recreation, roads, timber
140401011401	Klondike Creek	BTNF	Moderate	Extensive	Range, roads
140401011402	Rock Creek	BTNF (W)	Moderate	Limited	Range
140401011403	Gypsum Creek	BTNF (W), private	Moderate	Extensive	Range, insect/disease, roads, timber
140401011501	Tosi Creek	BTNF (W), private	Moderate	Extensive	Range, roads
140401011601	Dollar Creek	BTNF	Moderate	Limited	Range, roads
140401011602	Crow Creek	BTNF	Moderate	Limited	Range, other-human
140401011603	Moose Creek	BTNF (W)	Moderate	Limited	Other-human, roads
140401011604	Roaring Creek	BTNF (W)	Moderate	Limited	Range, other-human, roads
140401011806	Miner Creek	BTNF, private	Moderate	Limited	Range, roads, timber
140401011502	Tepee Creek	BTNF (W)	Low	Extensive	Range, roads, timber
Sub-Basin: Gros Ventre River					
170401020206	Bacon Creek	BTNF	Moderate	Limited	Roads, other-natural, range, insect/disease, recreation
170401020402	Leeds Creek	BTNF	Moderate	Limited	Range, roads, timber
170401020403	Seven Lakes	BTNF (W)	Moderate	Limited	Roads, other-natural, timber, fire, range, insect/disease, recreation
170401020502	Kinky Creek	BTNF (W)	Moderate	Limited	Roads, range, timber
170401020503	Dry Fork	BTNF (W)	Moderate	Limited	Recreation, other-natural, range

*BTNF = Bridger-Teton National Forest; BTNF (W) = Bridger-Teton National Forest (part Wilderness)

- The Forest Plan provides direction for managing fisheries resources on the Bridger-Teton National Forest. This direction comes in the form of land management goals and objectives and standards and guidelines for resource protection. Forest-wide standards and guidelines applicable to this project are discussed in more detail in

Chapter 2 of this document (under "Items Common to All Alternatives"), and a complete list of all Forest-wide standards and guidelines can be found in Chapter 4 of the Forest Plan (pp. 121-145).

Soils and Potential Natural Vegetation

Desired Future Conditions

Activities are planned to protect the quality of the basic watershed resources of soil, water, and air.

Existing Condition

Soil productivity is the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation (FSH 2509.18).

Soils and Potential Natural Vegetation (PNV) information are summarized for each grazing allotment within the Upper Green River AMP EIS area. Soils within each allotment are summarized for Erosion and Compaction Hazard ratings and maps for each allotment indicate their relative distribution. Brief descriptions are located in project record that provide more detailed information about the soil and PNV types, including a discussion of management implications associated with grazing. Complete documentation including detailed plot information can be found in the Bridger East Ecological Unit Inventory (EUI) document.

A field visit to the Tosi-Tepee Creek pasture in the Upper Green allotment was conducted in August of 2003. Soil quality criteria were assessed for the area and some visual evidence of puddling was present but no evidence of compaction. Stream bank erosion and impacts of trailing were evident in some areas of Tepee creek (see related hydrology and fisheries section). Region 4 Soil Quality Guidelines state that no more than 15 percent of the activity area (allotment) should be detrimentally disturbed (FSH 2509.18). Monitoring of soil quality parameters will be incorporated into AMP's.

Soil Compaction and Erosion Hazard Ratings

The rating criteria were adopted from the Region 4 Soil Interpretive Guide May 1995 and the NRCS National Forestry Manual. The delineations used to display the ratings are from the map units developed from Bridger East Ecological Unit Inventory conducted in the area from 1993 through 1997. The ratings displayed on the maps are based on a representative value for the map unit as a whole. Since a map unit may have up to three soil components with different ratings, it is important to determine the exact location and rating for each soil component within a map unit when conducting more detailed analysis or developing individual allotment plans. Tables 3-18 and 3-19 summarize the relative percent of each allotment area for compaction and erosion hazards.

Soil Compaction Ratings: This rating describes the risk of inducing soil compaction through timber harvest, livestock grazing, or recreation activities. Soil compaction decreases the macropore space, increases bulk density, and results in damaged soil structure. Decreased porosity reduces infiltration and percolation, increases surface runoff, and encourages erosion. The physical, chemical and biological effects of compaction tend to restrict plant growth.

The ratings are based on the soil textural class, coarse fragment content and shape, O horizon thickness, and soil structure, and use a weighted average of the top 12 inches of mineral soil. This rating assumes moist or wet soils. Dry soils are not as easily compacted as moist or wet soils. Frozen ground also tends to minimize the effects of compaction. Areas with high or moderate compaction hazard ratings may require restrictions on use during high moisture conditions.

As a result of intensive use by cattle, wildlife, and/or wheeled off-road vehicles, soils with a slight limitation rating will generally not suffer an irreparable reduction in their long-term natural productivity. Soils with a moderate limitation rating will suffer a significant reduction in their long-term natural productivity capability. However, soils with a moderate rating can be managed for sustained natural productivity by controlling the timing and intensity of use, and their natural productivity can be restored through the application of relatively simple soil compaction amelioration treatments. Soils with a severe limitation rating will generally suffer a reduction in their long-term natural productivity level, even with limited grazing.

Soils within each allotment are rated for compaction hazard and the relative ratings are displayed in table 3-18. For all the allotments, approximately 70 percent of the land area rated as having a moderate compaction hazard. The remaining 29 percent rated severe while only 1 percent is rated as low. The Beaver-Twin and Green River allotments have the highest amount of area with severe ratings. Over 40% of the project area is not used by domestic livestock due to distance from water, steep slopes, inaccessibility and/or insufficient amounts of forage for cattle. Many of the soils that are at risk or high hazard soils are within the 40% already determined to be unused by livestock. Individual allotment management plans use the compaction hazard maps to identify areas with moderate or high ratings and monitor heavy use areas for compaction throughout the grazing cycle.

Table 3-18
Compaction Hazard ratings by Allotment (percent of area)

Compaction Hazard	Roaring Fork	Beaver Twin	Noble Pastures	Badger Creek	Green River
Severe	20%	52%	6%	12%	55%
Moderate	75%	45%	94%	88%	45%
Low	5%	3%			

Erosion Hazard Ratings: Erosion hazard is the probability that damage will occur as a result of disturbance activities that expose the soil surface. Disturbance activities may include overgrazing, fire, fire lines, and off-road and off-trail travel. Erosion hazard ratings are based on slope, k-factor, and rock fragments on the surface layer. "Slight" refers to soils

where erosion is unlikely under ordinary climatic conditions. "Moderate" refers to soils where some erosion is likely and control measures may be needed. "Severe" refers to soils where erosion is very likely and control measures for vegetation re-establishment on bare areas and structural measures are advised.

Ratings assess sheet and rill erosion that result from exposed soil surfaces caused by various management practices such as grazing, mining, fire, or fire lines. These are activities that may disturb the soil, resulting in 50 to 75 percent bare ground in the affected area. Ratings assume a 50 to 75 percent exposed, roughened mineral surface layer.

For all the allotments, approximately 78 percent of the land area rated as having a moderate erosion hazard. The remaining 20 percent rated slight while only 2 percent is rated as high. Individual allotment management plans should use the erosion hazard maps to identify areas with moderate or high ratings and monitor percent bare ground throughout the grazing cycle. When bare ground exceeds 50 percent, these areas should be rested to allow re-establishment of vegetation.

Table 3-19
Summary Erosion Hazard by Allotment (percent of area)

Erosion Hazard	Roaring Fork	Beaver Twin	Noble Pastures	Badger Creek	Green River
High	1%	4%			3
Moderate	69%	85%	94%	88	55
Slight	30%	11%	6%	12	42

Ecological Unit Inventory Information

The Ecological Unit Inventory (EUI) maps and corresponding map unit descriptions in the Planning Record provide detailed descriptions of ecological types, landforms, geology, parent materials, soils and potential natural vegetation types. Ecological type descriptions are summarized and management implications related to grazing are included.

Management implications for each ecological type describe their suitability for livestock production, and response to grazing and trampling. The livestock production section describes the relative forage productivity and palatability. Any limitations to livestock access are also discussed. The responses of the plant community to grazing by livestock or wildlife are also discussed as well as the effects of trampling for riparian areas and tundra types. Most of the timber types listed provide essentially no forage for livestock due to very low understory production, but on gentle terrain may provide shade and shelter from storms.

The plot data used to develop the ecological types contains plant community composition tables which list the most common or abundant plant species in the ecological type by growth form. These data include the common name, plant code, constancy, mean cover and ecological role of each species. The plots can be used as references when comparing existing range condition to potential natural vegetation within the spatial extent of a particular

ecological type. Geographic locations of the plots and associated data are available in the planning record.

Social and Economic Impacts

Desired Future Condition

Manage grazing programs to support economic diversity in local communities, and as a tool in meeting resource objectives.

Existing Condition (for additional historic information see the Heritage section)

Human uses within the project area play a role in the economic vitality of the surrounding communities. Much of the State of Wyoming is under Federal land ownership and Sublette County is no exception. Approximately 19% of Sublette County is under private ownership. The high proportion of federal ownership and rural nature of the area reduces the opportunity for industry as well as reducing the tax base for local governments. This, in turn, increases the dependence on products and services derived from National Forest Lands.

Agriculture (primarily beef and hay production), has been, and continues to be, an important industry in Sublette County and in the State of Wyoming. Domestic livestock grazing within and adjacent to the project area has played a key role in maintaining the vitality of Pinedale, Big Piney, and the surrounding communities since the early 1900s and the first significant numbers of non-native people in the county were associated with the cattle and sheep industry. Federal land grazing is an integral part of many ranching operations in Wyoming (Taylor, 2003). The petroleum industry, recreation and associated tourist industry have also added to the primary economic base of Sublette County.

Direct human economic dependency on National Forest land within the project area is greatest for livestock production, outfitting and tourist-related industry, and removal of forest products. The project area is also important to people for recreation opportunities, hunting, and other amenity values that are discussed elsewhere in this chapter.

Sublette County has experienced increased growth for the last several decades. Projections from the 2000 National Census are that Sublette County's population will continue to grow, with an estimated 2001 population of 6,081. This is an increase of 26 percent from the County's 1990 population of 4,843.

A large portion of the private property in Sublette County is owned and managed by large ranches. These ranches provide year round wildlife habitat as well as critical winter ranges and migration corridors for Sublette County’s migratory mule deer and pronghorn antelope herds. Sublette County is ranked 13th among 263 counties in seven western states in the Rocky Mountain region in terms of the potential for conversion of prime ranchland to residential development (AFT, 2002).

Timber Harvest

It is estimated that in 1901 some 2.6 million ties were replaced, and the effect of this massive operation on the landscape was significant. Composition of the forest cover was changed by removing lodgepole pine and leaving spruce and fir, because lodgepole pine was the most suitable timber type for railroad ties. In addition, floating a large number of ties down the Green River and its tributaries resulted in scouring of the riparian areas and alterations to the river bed and channel. The effects of this activity can still be seen today.

Active timber harvesting occurred in the project area from 1950 to 1980, when portions of the Mosquito Lake country were clear-cut to supply timber for mills operating in Dubois and Afton. In 1956, an extensive harvest of spruce began in the Moose and Gypsum creek drainages in an attempt to control an epidemic of spruce bark beetles. The North Beaver Timber Sale, the only large timber sale to occur within the assessment area since 1993, was harvested during 1997-98. This sale involved the removal of 497,000 board feet of live, mixed conifer sawtimber and 75,000 board feet of dead, mixed-conifer sawtimber. The sale selectively cut mature, diseased and dead trees over 97 acres.

Other recent (since 1993) timber harvest activities have been limited to small sales of personal use products, predominantly firewood. These sale activities have also included posts, poles, and minor amounts of house logs. Over the past five years, an estimated 600 cords (300,000 board feet) per year have been harvested within the project area. There has also been an average of one sawtimber sale for personal use per year, or an average of 5,000 board feet per year.

Livestock Grazing

During the early 1900's, the Forest Service developed a grazing allotment system in the project area. The probable purpose of this allotment system was to fairly allocate forage between the local users, to derive a financial return to the public for use of this public land, and to limit overuse of the forage resource. The allotment system set geographic boundaries for various users or groups of users (livestock grazing associations) and limited the season of use for livestock grazing.

Livestock grazing is a traditional use in the assessment area. Historically, the number of animals grazed in this area was substantially higher than current numbers. What follows is a brief summary that highlights historic and current domestic livestock grazing on each of the six grazing allotments that are within the assessment area.

Upper Green River Allotment – historic use

The Yellowstone Park Timber Land Reserve was created in 1891; after the creation of the Yellowstone Forest Reserve in 1902 the Upper Green River Allotment became part of the Wind River Division, then part of the Wyoming National Forest in 1908. In 1910, it became part of the Wind River and Bonneville National Forests and that year the current northern and western boundaries of the allotment were fenced. In addition to livestock use originating from livestock operations in the Upper Green River Valley, cattle from Dubois trailed through the allotment to graze the Elk Ridge area. Prior to and including the 1924 season, 10,977 head of cattle and horses were permitted to graze on this allotment, which included

what is now the Elk Ridge Grazing Allotment Complex. Livestock would drift onto the allotment in late July and drift off the Forest by late August, from and to adjacent public and private lands. In 1924 the Upper Green River Allotment was reduced to an approved use of 10,000 head.

Beginning in 1930, the approved season of use was from June 16 through October 15. Approved use for the allotment was reduced to 8,000 head of cattle and permitted sheep grazing (after the conversion of the Teepee Creek area to sheep grazing) and permitted numbers were held within this authorization by 1935. From 1930 through approximately 1956 sheep were grazed in the Teepee Creek area of the allotment. In 1957 the Upper Green River Cattleman's Association agreed to exchange their permitted use on Klondike Creek for the permitted sheep grazing use in the Teepee Creek area.

Upper Green River Allotment – current use

The Upper Green River Allotment is primarily within the Green River drainage of the Colorado River System. The allotment area covers 130,100 acres. The Noble Pastures and Wagon Creek allotments are separate allotments within the boundaries of the Upper Green River Allotment.

The Upper Green River Allotment has a permitted grazing authorization of 7,565 head of cattle and 43 head of horses, which makes it the largest allotment in the National Forest System. There are currently 16 entities permitted to graze livestock on this allotment. It is divided into five areas, each with a grazing season of June 16 to October 15. The five areas are:

- Mud Lake/Fish Creek Area: The Mud Lake/Fish Creek Area is authorized for grazing by approximately 2,800 cattle units. This area is located in the northern and northern-central portion of the assessment area. Livestock are moved around the allotment in a deferred rotation system. This means that at the beginning of the season, livestock begin to graze at a different location within the area than they did the previous season. This system ensures that vegetation is given an opportunity to develop or put on seed, improving its viability and ability to be grazed at the same time every year.

- Tosi Creek/Teepee Creek Area: The Tosi Creek/Teepee Creek Area is authorized for grazing by approximately 1,000 cattle units. This area is located in the northern part of the western-central portion of the assessment area. Livestock are moved around the area in a deferred rotation grazing system. The Tosi Creek/Teepee Creek Area is currently under a Forest Service-sanctioned monitoring program in which Permittees measure vegetative species composition and use, as well as stream bank stability.

- Gypsum Creek Area: The Gypsum Creek Area is authorized for grazing by approximately 2,000 cattle units. This area is located in the eastern-central portion of the assessment area. Livestock is moved in a deferred rotation grazing system, alternating between the northern and southern parts of the area.

- Mosquito Lake Pastures: Mosquito Lake Pastures are authorized for grazing by approximately 1,800 cattle units. This area is located in the northwestern portion of the assessment area, and it is the only area that is fenced separately. Livestock are moved in a rest rotation grazing system. This means that one of the four pastures is not grazed each year, which allows the rested area a full season to develop. The remaining three pastures are grazed on a deferred rotation grazing system throughout the season. The Mosquito Lake Pastures are currently under a Forest Service-sanctioned vegetative monitoring program conducted by the permittees.

- Kinky Creek Pastures: Historically the entire Kinky Creek Allotment was used by 213 cow/calf pairs for the established season of June 11th to October 15th. The allotment was managed under a four pasture deferred rotation grazing system. The Kinky Creek Allotment has historically been administered by the Jackson Ranger District and has been vacant for several years. The Upper Green Allotment boundary has moved to include the portion of the Kinky Creek Allotment on the Pinedale Ranger District. This portion of the old Kinky Creek Allotment will be analyzed as part of the Upper Green River Allotment in this document. Season of use, stocking density, rotation and allowable use for the area will be set by the new Upper Green River Allotment Management Plan as a result of this analysis if either of the alternatives that authorize grazing are chosen.

The stock driveway in the Upper Green River Allotment is divided into two main sections: the Marsh Creek-Boulder Creek Driveway and the Green River Bottom Stock Driveway. Marsh Creek-Boulder Creek Driveway begins on Marsh Creek at the Forest boundary near McDowell Flats. With the exception of some cattle that are trucked to the permit area, and the cattle in beaver-twin and badger allotments, the remaining cattle permitted with the project area use this driveway on their way to and from the Upper Green River Allotment each year. The driveway parallels the Green River Lakes Road (road # 650) in some locations. The stock driveway follows near the Green River from the Bend to the southern boundary of the project area.

Noble Pastures Allotment

The Noble Pastures Allotment was originally a parcel of private ground, known as the Wells Place, which was owned by the Nobles. In the winter of 1977-1978, the Nobles sold the property to the Forest Service, but retained the privilege of grazing the parcel in the form of a Term Grazing Permit. As a condition of the new Term Grazing Permit the permittee (Mike Noble) had to continue to maintain the ditch system required to irrigate the new allotment. The Noble Pastures Allotment is still grazed by livestock owned by the Noble family.

The Noble Pastures Allotment is located in the center of the assessment area. It covers 760 acres and lies on the western side of the Green River, within the boundaries of the Upper Green River Allotment. Currently, the permittee is authorized to graze 424 cattle units and 4 saddle horses on this allotment under a deferred rotation grazing system, which has a grazing season of June 14 to September 20.

Wagon Creek Allotment

Billy Hill initially homesteaded the Wagon Creek Allotment in approximately 1897. While he owned this land, the Wagon Creek Drift Fence was constructed during the 1920's or 1930's. The Forest Service, at the same time, constructed the drift fence that connects the surrounding private lands and formed the Wagon Creek Allotment. The Wagon Creek Allotment has historically been used to pasture a small herd of cattle owned by the permittee, as well as a small herd of horses associated with the Upper Green River Cattle Allotment.

The current Permittee's family has owned the private portions of the allotment since about 1952. The Wagon Creek Allotment is located just northwest of the bend of the Green River, within the Upper Green River Allotment. It covers 240 acres, in conjunction with adjacent private land. Currently the allotment is permitted for 52 cattle units in a deferred grazing system. Grazing is authorized for a 45-day period, deferred within a July 15 to October 15 grazing season.

Roaring Fork Allotment

In 1924, this allotment area was separated from the Upper Green River Allotment by the Roaring Fork Drift Fence, with the primary purpose of protecting it for winter game range. At this time, 170 head of cattle and 130 head of horses were retained on the Roaring Fork allotment, with an authorized season of use between June 16 and October 15. In 1937, records show that one permit allowed 55 head of horses, and that Upper Green River Cattle permittees also had 75 head of horses on the allotment. In 1943, because of the importance of the allotment to the well being of the Upper Green elk herd, a decision was made to reduce the number of horses allowed to graze from 130 head to 55 head. In 1950, the 55 head horse permit was relinquished. Since that time the permitted grazing has remained 170 head of cattle from 6/16 to 10/15 each year.

The Wyoming Game and Fish Commission established a winter elk-feeding program located just east of the bend of the Green River, and approximately two and a half miles north of the lower Green River Lake. The Commission moved the feedground west in 1948, off the allotment to a willow bottom near Moose Creek, because of the detrimental effect from the concentration of elk on aspen and drier southern slopes in the old location. In the winter of 1970-71, the elk feedground was moved to its present location on a wet meadow-shrub site.

The Roaring Fork Allotment is located in the northeastern portion of the assessment area. It covers 8,300 acres, and has a current grazing authorization of 170 cattle units from June 16 to October 15. Cattle are moved around the allotment periodically to help prevent livestock from congregating along the Green River bottom.

Beaver-Twin Creek Allotment

As originally established, the Beaver-Twin Creek Allotment included all of Rock Creek drainage, as well as Badger Creek, Big Twin Creek, Little Twin Creek, North Beaver Creek, Placer Creek, and Packer Creek drainages. In 1924, the Rock Creek drift fence was constructed to keep cattle from drifting down Rock Creek. From 1924 to 1927, 1,600 to 1,700 cattle used the area, excluding Packer and Placer creeks, for a grazing season between

June 16 and October 15. The permitted use was too high and resulted in overgrazing in the Upper Rock Creek and Twin Creek areas.

In 1928, the grazing season on date was set back to July 1. In 1929, permitted cattle numbers was reduced to 1,200 head. In 1930, 250 head of cattle use was changed to allow 1,000 head of sheep, which were grazed in the Badger Creek, Sawmill Meadows, Water Dog Lakes, and Bartlett Creek areas. Between 1,100 and 1,200 head of cattle used the area until 1933, when permitted cattle numbers were reduced to 779. Then in 1935, the number of cattle permitted to graze was reduced to 701.

The area set aside for sheep grazing was used from 1930 to 1940. In 1941 the sheep use was converted back to cattle, adding 200 head of cattle to the allotment. Lower Rock Creek remained sheep range, as it is today.

The Beaver-Twin Allotment is located in the southwestern portion of the assessment area, and covers 22,300 acres. The current grazing authorization is for 700 cattle units season long, from July 15 to October 15.

Badger Creek Allotment

In 1955, the fence separating Badger Creek and Beaver-Twin Creek allotments was constructed. Both cattle and sheep have grazed this area over time. Since 1956, approximately 157 cow/calf pairs have grazed this allotment from July 1 to September 30.

The Badger Creek Allotment is located on the eastern side of the Beaver-Twin Allotment, in the southwestern portion of the assessment area. It covers 7,300 acres, and has a current grazing authorization for 157 cattle units season long, from July 1 to September 30.

Livestock Grazing – Existing Condition summary.

The project area includes six domestic cattle grazing allotments with 21 individual permit holders currently authorized to graze domestic cattle and horses on the six allotments. Current total grazing authorizations for these allotments are for approximately 9,000 cattle (cow/calf pairs, bulls, and/or yearlings) and 50 pack or saddle horses for a total of approximately 46,100 AUMs. Grazing seasons for each of the six allotments vary, but fall between mid June and mid October. The Beaver-Twin, Badger Creek, Wagon Creek, and Noble Pastures allotments do not have current Allotment Management Plans (AMPs), but the Upper Green River and Roaring Fork allotments do have AMPs. Most of the grazing allotments have been further subdivided into smaller units or pastures in order to confine the livestock into smaller areas and rotate use of the pastures.

The following table describes the total AUMs and grazing seasons that are currently authorized to use the allotments.

Table 3-20
Existing Conditions – Authorized Livestock Grazing within the Project Area

Allotment	Total Acres	No.	Kind	Class	Season	AUMs	Mgmt System
Badger Creek	7,300	157	Cattle	Cow/calf	07/01-09/30 3.0246564m	627	*Season Long
Beaver-Twin Creeks	22,300	700	Cattle	Cow/calf	07/15-10/15 3.0904104m	2856	Season Long
Noble Pastures	760	314 110 4	Cattle Cattle Horse	Cow/calf Yearling Horse	06/14-09/20 3.2547936m	1616	Deferred Rotation
Roaring Fork	8300	170	Cattle	Cow/calf	06/16-10/15 4.010958m	900	Rotation
Upper Green River	130,100	2800 1800 1000 2000	Cattle Cattle Cattle Cattle	Cow/calf Cow/calf Cow/calf Cow/calf	06/16-10/15 06/16-10/15 06/16-10/15 06/16-10/15 4.010958m	40,217	Mud Lake/Fish Creek-Deferred Rotation Mosquito Lake Pastures-Rest Rotation Tepee/Tosi Creek-Deferred Rotation Moose/Gypsum-Deferred Rotation
Wagon Creek	240	52	Cattle	Cow/calf	07/15-10/15 NTE 45 days 1.528767m	106	Deferred On/Off
TOTALS	169,000	9081				46,322	

Kinky Creek information is not included in the table above because livestock grazing use information was collected only for a larger portion of land than is now being analyzed. In addition, none of the alternatives propose additional grazing use from the capacity of this land area.

VEGETATION

Desired Condition

Create a species and age-class mix that is diverse and resilient to disturbance . Species mix and age class distribution will be within the historic range of variance, as defined in the Forest Proper Functioning Condition Assessment.

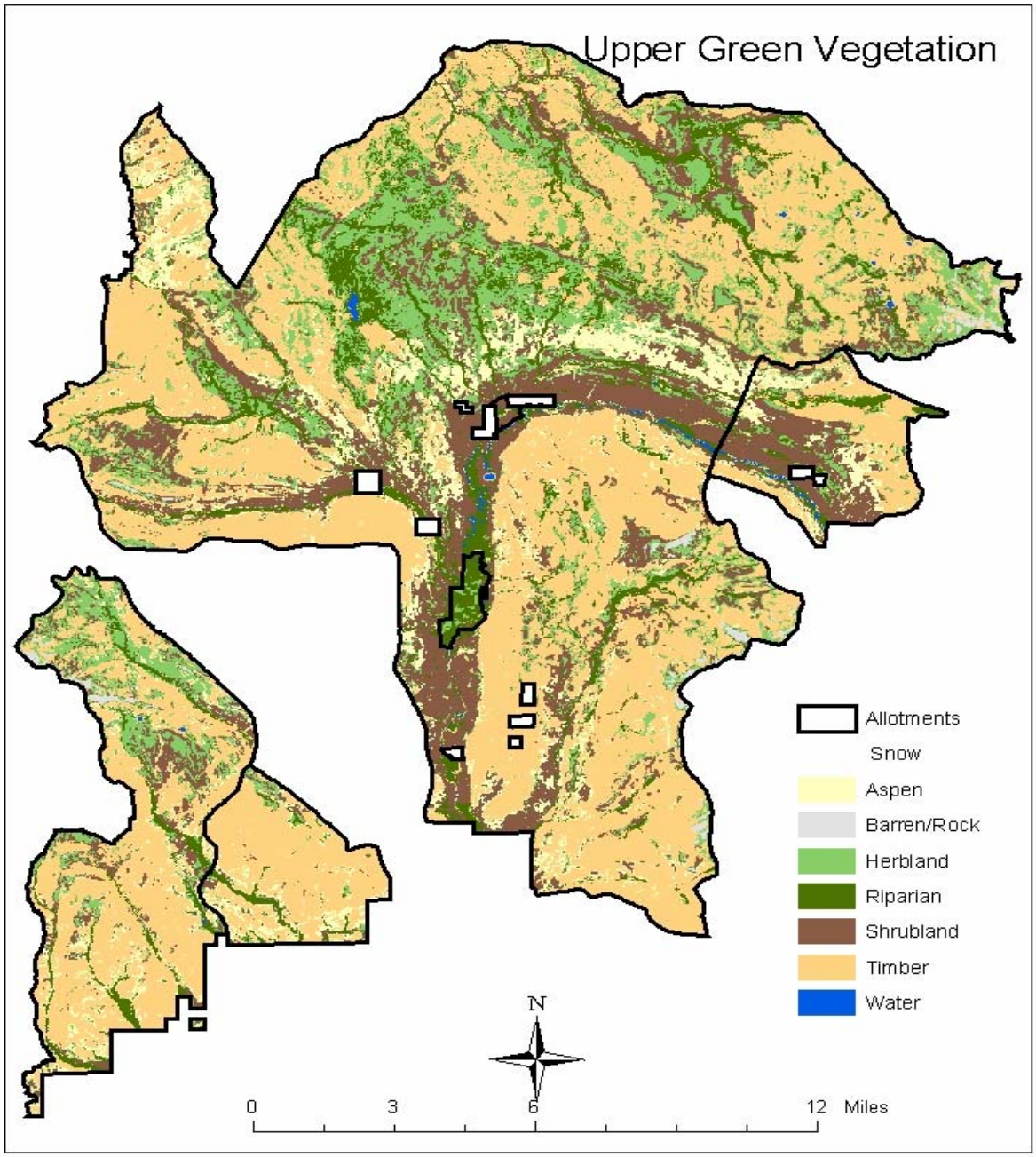
Existing Condition

Project area vegetation

The project area analyzed for vegetation includes the area within the boundaries of the six grazing allotments. Domestic livestock grazing within the scope of this analysis is confined to areas that provide forage and water for livestock and is located on terrain that is gentle enough to be preferred by livestock. In general, allotment boundaries are located on ridge tops that provide natural barriers to livestock travel and are buffered by forested vegetation that provides limited forage for livestock. Other portions of the allotment boundaries are located along land ownership boundaries, where the livestock management outside the boundary is beyond the scope of this analysis.

Existing vegetation in the project area is the result of past climatic regimes and disturbances, both natural and human-caused. Fire, timber harvesting, livestock grazing and other natural and human-caused disturbances have played significant roles in shaping existing conditions in this area. Vegetation maps for the project area are derived from remote sensing data collected and assembled for the Forest Service by Utah State University and summarized in the Idaho/Western Wyoming, Landcover Classification, Report and Metadata. The Utah State University vegetation classification identified 132 vegetation classes. In an attempt to improve accuracy, the Bridger-Teton National Forest condensed the 132 classes into 14 classes. The IDT for this analysis further condensed the vegetation classes into eight classes. The eight classes are represented on the following map.

Figure 3-4
Existing Vegetation in the Project Area



Rangeland vegetation

Five major vegetation types dominate the grazeable portion of the project area for this project. These vegetation types are more often associated with domestic livestock grazing due to the availability of forage as well as being associated with gentler topography that is preferred by domestic livestock. About half of the project area is comprised of vegetation types that are subject to livestock grazing. A description of each of these vegetation types follows. The Tall Forb type description is also included because, while it does not occupy a large portion of the project area, it has been deemed "at risk" in the 1997 Bridger-Teton Forest Properly Functioning Condition (PFC) report. The coniferous forest types are not included because the effects of livestock grazing are mostly confined to the other vegetation types.

Shrubland. (Covers approximately 17% of the project area.) This formation consists of areas dominated by sagebrush. Vasey big sagebrush occurs below 9,000 feet. Idaho fescue usually dominates the understory, but Richardson's needlegrass may be dominant in some plant associations. Other common graminoids include slender wheatgrass, sedges, timber oatgrass, columbia needlegrass, and prairie junegrass. Common forbs include sulphur buckwheat, lupine, rockcress, prairiesmoke, western yarrow, and northwest cinquefoil. Above 9,000 feet, subalpine big sagebrush is dominant.

Herbland. (Covers approximately 17% of the project area.) This formation consists of perennial grasslands, dry meadows, and alpine tundra. Idaho fescue dominates the grasslands at lower elevations. At higher elevations, Drummond's rush is dominant. Other common graminoids include spike trisetum, Cusick's bluegrass, alpine bluegrass, timber oatgrass, alpine timothy, and slender wheatgrass. Common forbs in the grassland types include pale agoseris, western yarrow, Stanley's whitlowgrass, flowery phlox, milkvetch, and lupines. Varileaf cinquefoil and creeping sibbaldia are common at higher elevations.

The Tundra formation includes four broad vegetation types. From dry to moist they are cushion plant communities, sedge-grass turf, geum-sedge turf, and dwarf willow communities. Cushion plant communities include moss campion, pussytoes, Rocky mountain nailwort, and common spikemoss. Sedge-grass turf is dominated by Payson's sedge. Geum-sedge turf is characterized by alpine avens, American bistort, alpine bluegrass, varileaf cinquefoil, and northern singlespike sedge. Arctic and snow willow dominate the dwarf willow communities.

Aspen. (Covers approximately 8% of the project area.) This species type is deciduous woodland dominated by quaking aspen. In the assessment area, this type occurs mostly on south, west, and east aspects. It occurs only occasionally on north-facing slopes. Common associated shrubs include Utah mountain snowberry, rose, and creeping Oregon grape. Common graminoids include Idaho fescue, slender wheatgrass, Wheeler's bluegrass, and spike trisetum. Common forbs include sticky geranium, Fendler's meadowrue, western yarrow, asters, lupine, and strawberry. Subalpine fir, Engelmann spruce, lodgepole pine, limber pine, and whitebark pine occur mostly as incidental seedlings and saplings.

Riparian. (Covers approximately 9% of the project area.) This type includes areas dominated by willows, mountain silver sagebrush, shrubby cinquefoil, sedges, and tufted hairgrass.

Tall Forb. Tall Forb communities cover less than 1% of the Upper Green project area. (Tall Forb Communities were grouped with the Herbland communities on the Vegetation Map.) Typically this type occurs at elevations between 6,300 and 11,000 feet where yearly precipitation ranges between 30 to 40 inches and soils are greater than 18 inches deep. Some tall forb and mixed forb/grass areas are found in upper Gypsum Creek and the Twin Creek area. Common species are numerous and can include sticky geranium, fernleaf licoriceroot, Indian paintbrush, lupine, tall larkspur, and arrowleaf balsamroot. In general, cattle avoid these areas for grazing as they prefer grass species. More commonly, tall forb areas will be utilized for domestic sheep grazing as is found in the Elk Ridge complex, adjacent to the Upper Green project area.

The Region 4 Properly Functioning Condition Assessment (1996) indicates tall forb communities are at "high risk": "Approximately 50 percent of this type was lost across the Rocky Mountain Region years ago due to improper grazing, which causes a significant loss of soils. The remaining 50% of the tall forb community is at extreme risk if current grazing practices continue to degrade its composition and structure…". There is considerable diet overlap with domestic sheep, elk, and mule deer in the tall forb communities, but minimal overlap with cattle.

The desired future condition for Tall Forb plant communities is to "Maintain existing tall forb communities, and where possible, re-establish populations where site potential is appropriate. Because of the common occurrence of summer thunder storms in areas supporting tall forb, and because of the presence of moderate to highly erosive loamy soils, ground cover values with greater than 15-20 percent bare soil will usually result in excessive soil losses from these areas (Winward 1998)".

The intent of the previous discussion of vegetation types is to characterize the existing vegetation and put into perspective the effects that domestic livestock grazing may have on the environment. Domestic livestock grazing, as proposed, would not be expected to cause significant shifts in extent of the types of vegetation described above. Livestock grazing is more likely to cause shifts in the species composition, age class, and plant vigor within the broad-scale vegetation types described above. The authors of the Upper Green LSA recognized this and thus described desired future conditions for these types in terms of age class distribution and species composition (see LSA page 3-33). Further discussion of vegetation will be describe the condition and trend of rangeland vegetation in terms of vegetative health (or functionality) as indicated by groundcover, cover by life form, or in terms of the severity and frequency of grazing use on plant species.

Grazing systems

The Forest Plan requires that allotments that have season-long grazing systems be changed to rotational grazing systems as AMP's are revised. Rotational grazing is designed to alter the timing of grazing induced stress to plants. This change in timing reduces physiological stresses on the most palatable plants because different plants or species of plants may be

more desirable at different times of the year, and because deferring the use period allows plants additional time to capture and use nutrients needed to restore plant health.

The Badger Creek Allotment is currently under season long grazing. The permittee currently herds the cattle and uses salt placement in an effort to achieve better livestock distribution. The Beaver-Twin Creeks Allotment is also under season long grazing. The grazing system on the Roaring Fork allotment also incorporates season-long grazing, although a grazing rotation is commonly accomplished by starting the livestock on the east side of the allotment and moving them west in one year, followed by a west to east rotation the next.

Grazing capacity

Grazing capacity information for portions of the project area is based on Range Analysis information collected during the 1960's. Grazing capacity is defined as the maximum amount of livestock grazing that can be sustained on a land unit for a specific period of time without inducing damage to vegetation or related resources. Calculating the average amount of forage produced per acre on the land area and multiplying the number of acres within the land area results in a grazing capacity determination that is expressed in animal unit months (aum's). The land area within a grazing allotment supports a variety of vegetation types capable of producing different amounts of forage, thus, grazing capacity is determined by aggregating the production and acreage figures from the different vegetation types within the grazing allotment. Grazing capacities were used as initial figures to compare the livestock use that was occurring to the capability of the land to support livestock grazing. More recent methods of analyzing grazing use have focused on reducing impacts to the most sensitive areas or resources. The following table is a summary of the percentage of available forage for selected allotments. This is an estimate of available forage used under current stocking levels, as indicated by grazing capacity surveys.

Table 3-21

Allotment	%of available forage used by livestock	Date information collected
Roaring Fork	18	1968
Upper Green	50	1964
Wagon Creek	32	1964

Livestock grazing effects monitoring

In order to describe the existing vegetation condition in sufficient detail to evaluate the effects of domestic livestock grazing, the IDT focused on definitions of and establishment of key areas. Key areas are representative areas defined as, "a relatively small portion of rangeland which because of its location, grazing or browsing value, and/or use, serves as a monitoring and evaluation site. A Key Area guides the general management of the entire area of which it is a part, and will reflect the overall acceptability of current grazing management over the range.

At least one key area has been selected for every pasture in the project area. The key areas were selected, based on local knowledge of sites that are indicative of the level of domestic

livestock use that occurs within each pasture. This local knowledge was supplemented and validated with an expected-use model to predict areas of livestock congregation. This model takes into consideration landscape features that govern the expected congregation locations of domestic cattle on rangelands without active herding (Guenther et al. 2000). These physical landscape features include distance to water, vegetation types, and slope. Once the key areas were selected, they were overlaid with a coverage of point data which was collected by a team of scientists in preparation for the Bridger-East Ecological Unit Inventory (EUI). Most of the vegetation data was collected from 1991 through 1995, although fieldwork continued through 1997. By overlaying the key areas with the EUI point data, the ID team was able to select specific key sites for each key area. Fifteen of the twenty-six key sites have EUI point data associated with them. Twenty-six total key sites were identified by the ID team. Because key areas are meant to be representative of a larger area and to be indicative of the level of livestock use, a change in livestock management may result in the need to choose a new key area or site. The Interdisciplinary Team chose the location of the twenty-six key sites. If, through adaptive management, a key site needs to be changed, an interdisciplinary process will be used. The interdisciplinary team will solicit input from permittees or others that are familiar with the area.

Additional information on existing vegetation was obtained from a number of sources. Other sources included range vegetation monitoring studies that were completed as early as the 1950's and as recently as the summer of 2002; data was collected by Forest Service Personnel, University of Wyoming Personnel, and livestock grazing permittees. Often the studies were completed as a cooperative effort including representatives of all three groups. Many of the long term monitoring sites maintained by permittees and the Forest Service would qualify as key sites. The data from these established sites are incorporated into this analysis. Summaries are available in the project record while raw data is located in Pinedale Ranger District files.

This data is also used to measure how well livestock management is meeting the current Forest Plan direction. The Intermountain Region (R4) of the U.S. Forest Service recommends minimum ground cover thresholds for upland plant communities. These ground cover thresholds are used to indicate proper functioning rangeland (watershed) condition[2]. Functionality was defined as keeping soil/watershed physical components intact to provide for long-term sustainability and recoverability. Ground cover, for this purpose, was defined as any cover that is not bare ground or rock less than three-quarters of an inch. It included vegetation, litter, rock, moss/lichens, and cryptograms. These parameters were used to establish some of the objectives described in the alternatives.

R4 Ground Cover Threshold (objectives) by Plant Community Type

Alpine grassland (Herblands)	$\geq$90% cover
Tall forb	$\geq$65% cover
Sage/grass (Shrublands)	$\geq$70% cover
Aspen	$\geq$80% cover

2 Intermountain Letter of July 7, 1997, File code 2210, Subject: National Rangeland Inventory.

The Rocky Mountain Research Station along with the BTNF gathered additional local data and developed a set of criteria more reflective of the conditions and capabilities of this area. These criteria are illustrated as follows:

Table 3-22
Indicators of Rangeland Health and Functionality in the Intermountain West (June 2003)

SRM Cover Type	Percent ground cover needed for proper physical functionality
Alpine (Herblands)	90
Tall Forb	80
Mountain big sagebrush (Shrublands)	85
Aspen	95

In some instances, the IDT established more stringent objectives or desired conditions for ground cover than those illustrated above. In those cases, the reason for changing the objective was because ground cover measurements in that key area were higher than the minimum needed for proper functionality. In those cases, the IDT decided that since higher % groundcover was possible, and was achieved in the presence of current and historic grazing impacts, it was desirable to maintain additional ground cover. In those cases where desired condition was greater than the existing condition, prescriptions to achieve the desired condition were outlined by the IDT. Those prescriptions are described in Appendix 1, as mitigation measures associated with the proposed action.

Table 3-23
Ground Cover Measurements for Key Sites and EUI data points in the Project Area (1992-2002)

Allotment	Unit	Year Surveyed	Vegetation Type	Desired Cover %	BTNF Cover %	R4 Cover %	Existing Cover %*
Upper Green	Middle Gypsum	1992-1995	Sage/grass	90	85	70	**94**
Upper Green	Upper Gypsum	1992-1995	Sage/grass	90	85	70	**97**
Upper Green	Mud Lake East	1992-1995	Sage/grass	90	85	70	**95**
Upper Green	Mud Lake East	2002	Sage/grass	90	85	70	**99**
Upper Green	Mud Lake East	2002	Sage grass	90	85	70	**98**
Roaring Fork		1992-1995	Sage/grass	90	85	70	**100**
Roaring Fork	SE Area	2002	Sage/grass	90	85	70	**98**
Roaring Fork	NW Area	2002	Sage/grass	90	85	70	**100**
Roaring Fork		1992-1995	Willow	95	XX	XX	**100**
Upper Green	Mosquito SE	1992-1995	Sage/grass	85	85	70	**85**
Upper Green	Mosquito NE	2002	Sage/grass	90	85	70	**98**
Upper Green	Mosquito NE	1992-1995	Sage/grass	85	85	70	80
Upper Green	Mosquito NW	2002	Sage/grass	85	85	70	**93**
Upper Green	Mosquito NW	1992-1995	Sage/grass	85	85	70	**88**
Upper Green	Mosquito SW	2002	Sage/grass	85	85	70	67
Upper Green	Mosquito SW	2002	Sage/grass	90	85	70	**91**
Upper Green	Mosquito SW	1992-1995	Sage/grass	90	85	70	**99**
Upper Green	Upper Tepee	1992-1995	Sage/grass	90	85	70	**92**
Upper Green	Lower Tepee	2002	Sage/grass	85	85	70	83
Upper Green	Lower Tepee	1992-1995	Willow	95	xx	xx	**95**
Beaver-Twin	Little Twin	1992-1995	Sage/grass	90	85	70	**90**
Beaver-Twin	Little Twin	2002	Sage/grass	85	85	70	82
Beaver-Twin	North Beaver Ck.	1992-1995	Tall forb	80	80	65	75
Beaver-Twin	Waterdog	1992-1995	Sage/grass	90	85	70	**96**
Beaver-Twin	Upper Little Twin	2002	Sage/grass	85	85	70	64
Beaver-Twin	Rock Creek	1992-1995	Sage/grass	90	85	70	**98**
Noble Pastures	Pasture 1 (north)	2002	Riparian	95	xx	xx	**94**
Noble Pastures	Pasture 1 (north)	1992-1995	Riparian	95	xx	xx	**94**
Noble Pastures	Pasture 2	1992-1995	Riparian	95	xx	xx	**99**
Noble Pastures	Pasture 2	2002	Riparian	95	xx	xx	**100**

Table 3-23 (continued)
Ground Cover Measurements for Key Sites and EUI data points in the Project Area (1992-2002)

Allotment	Unit	Year Surveyed	Vegetation Type	Desired Cover %	BTNF Cover %	R4 Cover %	Existing Cover %*
Noble Pastures	Pasture 3	1992-1995	Riparian	95	xx	xx	**99**
Noble Pastures	Pasture 3	2002	Riparian	95	xx	xx	**100**
Noble Pastures	Pasture 4 (south)	1992-1995	Riparian	95	xx	xx	**100**
Noble Pastures	Pasture 4 (south)	2002	Riparian	95	xx	xx	**100**
Wagon Creek		2002	Riparian	95	xx	xx	**93**

Not every pasture listed. XX denotes no such field in that guide.

Livestock grazing effects monitoring – Cooperative monitoring summary

Introduction

In 1982, the USFS established photo points on the Tepee Creek Pasture of the Upper Green River Cattle Allotment to document stream bank stabilization. In June of 1996, permanent transects were established on the Upper Green River Cattle Allotment in a cooperative effort between the USDA-Forest Service, University of Wyoming Agriculture Extension (UW), and Upper Green River Cattleman's Association (UGRCA). The transects were placed in areas of concern, or areas receiving significant seasonal use, to monitor trend and measure utilization or any significant shift in the vegetation composition in the Upper Green area.

In 1996, nineteen permanent monitoring sites were established in the Mosquito Lake Pastures of the Upper Green River Cattle Allotment. In 1998, twenty-five sites were established in the Tepee Creek Pasture and eight sites were established for the South Fork of Gypsum Creek Pasture. All sites are monitored as the cattle are moved from pasture to pasture. The monitoring techniques include, but are not limited to, permanent photo points, cover by life form transects, greenline transects, and utilization measurements.

Tepee Creek Flats Pasture

A. Photo Points

- Photo points established by the USFS in 1982 on Tepee Creek were designed to see if the point bars in the stream were revegetating and the stream banks stabilizing. Photos were retaken in 1987, 1990, and 1998. In 1998 these twenty photo points became monitoring sites 1 through 20. Photos were taken of the Tepee Creek area again in 2002.
- No significant trend could be determined when the photos were retaken in 1987. When the photo points were taken in 1990, 1998 and again in 2002, a significant upward trend in stream bank stability became evident. A slight increase in willow production on the stream banks can be seen in the photos taken in 1990. The same

photos taken in 1998 and 2002 again show increased willow production and an increase in Carex production on point bars.

B. Utilization

- Sites 2 through 20 were also incorporated into a greenline transect. The average stubble height on the greenline in sites 2 through 20 was 6.9 inches in 1998, 8.5 inches in 1999, and 7.2 inches in 2000. Five additional sites were established on Tepee Creek in 1998 that were not associated with the original photo points. The greenline at site 24 showed average stubble heights of 5.9 inches in 1998, 6.6 inches in 1999, 6 inches in 2000, and 6.2 inches in 2001. The upland sites on Tepee Creek showed utilization measurements in 1998 of 2%, 1999 of 12%, 22% in 2000, and 26.4% in 2001. Increased utilization on this site likely reflects drought conditions beginning in 2000; because of drought less forage is produced.

C. Trend

- Transects to measure the trend of the vegetation complex along Tepee Creek have been established. No discernable measured trend can be established since measurements began in 1998.
- Photo points 1-20 show an apparent upward trend of the stream system and associated vegetation. An increase in willow production and stream bank stability occurred between 1990 and 1998. The series of photos taken in 2002 shows a need for additional watershed restoration efforts on Tepee Creek. These photos show that Tepee Creek has improved significantly in the past 20 years, through minor adjustment in grazing management. An increase in beaver activity in Tepee Creek has occurred since 1998.

Mosquito Lake Pastures

A. Photo Points

- Photo points have been established on 19 monitoring sites in the Mosquito Lake Pastures. Photo points associated with sites 1-8 were established in 1996. Photo points for sites 9-19 were set up the following grazing season in 1997. These photos will be used for long- term trend assessment.
- Sites 2-4 are located in the SW pasture. Sites 1, 5-9 are located in the SE pasture. Sites 10-14 are located in the NW pasture. Sites 15-19 are in the NE pasture. No apparent trend can be determined from the photos.

B. Utilization

- Utilization measurements are taken in the Mosquito Lake Pastures every year on the upland sites, while the greenline is measured for stubble height. The pastures are set up on a four-year rest-rotation schedule so that one of the pastures is rested every year. Trend analysis is run on one pasture every year in the rested year setting up a four-year trend analysis cycle.
- See the chart below for the range of utilization measurements taken from 1996-2000. The Utilization measurements were collected at Sites 2- 5, 8, 10-13, 15, 17-19.

Table 3-24
Utilization and stubble height measurements

Year	1996	1997	1998	1999	2000	2001
Range of Utilization on Upland Transects	12%-22%	Trace-26%	3.1%-19%	12.6%-30%	8.9%-25%	5.6%-31.7%
Range of Stubble Height on greenline	5.1”-5.9”	5.5”-9.3”	6.8”-11.4”	5.9”-11.6”	4.65”-8.9”	6”-9.4”

(Plant growth from one season to the next varies significantly due to precipitation and temperature during the growing season.)

C. Trend

- Baseline trend data was established on sites 1 through 8 in 1996 and on sites 9 through 19 in 1997, with cover by life form data being collected on sites 2, 4, 8, 10, 11, 13, 17, and 18.
- Enough data has been collected to begin running trend analysis following the 2001grazing season. No measured trend change can be determined at this time.

South Fork of Gypsum Creek

A. Photo Points

- 18 Photo points were established in the South Fork of Gypsum Creek drainage in 1999.
- Trend photo points 1-9 and 16-18 were established in the Lower Park above the stock bridge. Trend photo point #10 was taken in the small meadow between the Upper and Lower Parks. Trend photo points 11-15 were established in the Upper Park.
- Baseline data was taken in 1999 and was retaken in 2001.

B. Utilization

- Utilization is read on site #6 in the Upper Park and along a greenline transect at Site #7 in the Upper Park.
- Utilization measurements taken in 1999 and 2001 show utilization ranging from 15-35% on site #6 and an average stubble height on the greenline transect of site #7 of 6.0 inches in 1999.

C. Trend Transects

- A cover by lifeform transect was established at site #3 in the Lower Park.
- Baseline data revealed 15% grasses, 8% shrubs, 60% forbs, 4% litter, 0% rock, and 13% bare ground.
- Trend data was collected in 2001. No measurable trend change can be established from the current data.

Monitoring Summary

The UGRCA actively monitors utilization on the allotment. The utilization measurements are taken to document compliance with the permittees' Annual Operating Instructions. Utilization measurements on pastures of the Upper Green River grazing allotment have not exceeded 35% on any of the upland monitoring sites measured in the last six years, nor has the average stubble height on the greenline been less than 4.65 inches. (Maximum allowable utilization during the monitoring period was 65% on the riparian areas and 60% on the upland.) All photo point, transect, and trend information can be found in its entirety at the Pinedale Ranger District.

Non-native Vegetation

Areas of known noxious weed infestations within and near the project area include along the Green River Lakes Road, Green River Lakes campground and trailhead, the elk feedground, Whiskey Grove Campground, New Fork Lakes campground and trailhead (located just southeast of the assessment area), Beaver-Twin Creeks area, and along the Moose Creek-Gypsum Creek Road.

Most known weed infestations are in readily accessible areas near roads, campgrounds, and trailheads. Areas not completely inventoried include closed roads, roadless areas, timber sale areas, trails, wilderness areas, riparian corridors, and dispersed recreation sites. Efforts to enhance weed control during the 1999-2003 seasons include an increase in funding of chemical treatment, and releases of biological control agents on Canada thistle and musk thistle.

The establishment of non-native vegetation species that are not designated noxious, but that have the potential to out-compete native species, has occurred within the assessment area. These non-native species include, but are not limited to: Downey Brome, Kentucky Bluegrass, and Smooth Brome.

Table 3-25
Noxious Weeds Status Within the Project Area

Noxious Weed's Common Name	Noxious Weed's Scientific Name	Listed in Wyoming	Forest Priority	Acreage
Black henbane	*Hyoscyamus niger*	Yes	Yes	10 acres
Bull thistle	*Cirsium vulgare*	Yes		In musk acres
Canada thistle	*Cirsium arvense*	Yes	Yes	2500-3000 acres
Common burdock	*Arctium minus*	Yes		10 acres
Common tansy	*Tanacetum vulgare*	Yes		Not known to exist in the Project Area
Dalmation toadflax	*Linaria dalmatica*	Yes	Yes	Not known to exist in the Project Area
Diffuse knapweed	*Centaurea diffusa*	Yes		Not known to exist in the Project Area
Dyers woad	*Isatis tinctoria*	Yes	Yes	Not known to exist in the Project Area
Hoary cress (Whitetop)	*Cardia spp.*	Yes	Yes	Not known to exist in the Project Area
Houndstongue	*Cynoglossum officinale*	Yes	Yes	Not known to exist in the Project Area
Leafy spurge	*Euphorbia esula*	Yes	Yes	Not known to exist in the Project Area
Marsh sowthistle	*Sonchus arvensis*	Yes		In musk acres
Musk thistle	*Carduus nutans*	Yes	Yes	100-200 acres
Ox-eye daisy	*Chrysanthemum leucanthemum*	Yes		Not known to exist in the Project Area
Perennial pepperweed	*Lepidium latifolium*	Yes		10 acres
Quackgrass	*Agropyron repens*	Yes		Not known to exist in the Project Area
Russian knapweed	*Centaurea repens*	Yes	Yes	Not known to exist in the Project Area
Scotch thistle	*Onopordum acanthium*	Yes		Not known to exist in the Project Area

Table 3-25 (continued)
Noxious Weeds Status Within the Project Area

Noxious Weed's Common Name	Noxious Weed's Scientific Name	Listed in Wyoming	Forest Priority	Acreage
Spotted knapweed	*Centaurea maculosa*	Yes	Yes	Not known to exist in the Project Area
St. Johnswort	*Hypericum perforatum*	No		Not known to exist in the Project Area
Sulfur cinquefoil	*Potentilla recta*	Yes	Yes	10 acres
Yellow toadflax	*Linaria vulgaris*	Yes	Yes	10 acres

Range Improvements

Range improvements are vegetation treatments or structures used to improve range forage resources, to facilitate forage use, or to change patterns of use by grazing animals. Range improvements may also be used to exclude or reduce livestock use. Examples of treatments or non-structural improvements would include herbicide application to reduce sagebrush densities or seeding pasture grasses to increase forage production or attract livestock away from a natural congregation area. Structural improvements might include a spring development and water trough or a fence. Some structural range improvements may be necessary to implement a new grazing system. For example, if plans were made to change a grazing system from season long use to deferred use, a fence may be needed to divide a grazing allotment into two distinct pastures in order to restrict livestock movement from one pasture to the other. The following structural improvements have been constructed in the project area:

Table 3-26
Range Improvements in the Project Area:

Description	Location	Comments
Upper Green River Allotment		
Bacon Ridge Cattleguard	T41N,R111W, section 26	Built in 1990
McDowell Flat Driveway Fence	T37N,R109W, sections 30,31	1.5 miles, built in 1974
Pot Creek Driveway Fence	T37N,R109W, sections 7,18,19	2.5 miles barbed-wire, built in 1938
Jim Creek Boundary Fence	T37N,R109W, sections 5,6	2 miles barbed-wire, built in 1934
Gypsum Creek Boundary Fence	T38N,R109W, section 31 T37N,R109W, section 6	2 miles barbed-wire, built in 1947
Gypsum Hill Fence	T38N,R110W, section 25	.7 mile buck & pole, built in 1947
Kendall Drift Fence	T38N,R110W, section 14	.5 mile buck & pole, built in 1982
Kendall Drift Extension	T38N,R110W, sections 11,14	.1 mile barbed-wire, built in 1986
Klondike-Rock Creek Fence	T39N, R110W, sections 20,29	.7 mile, built in 1961

Description	Location	Comments
Tosi Creek Boundary Fence	T39N,R111W, section 16	.5 mile barbed-wire, built in 1955
Roaring Fork Boundary Fence-1	T39N,R109W, sections 11,15	1 mile barbed-wire, built in 1964
Roaring Fork Boundary Fence-2	T39N,R109W, sections 2,11	2 miles barbed-wire, built in 1964
Mosquito Lake Unit Fences	T39N,R110W, sections 2-4,9-11; T40N,R110W, sections 2,11-13,15,22-24,26,27,34,35; T40N,R110W, sections 17,18,20-22	21 miles barbed-wire, built in 1964
Mosquito Lake Extension Fence	T40N,R110W, sections 2-4	1 mile barbed-wire, built in 1982
Mosquito Lake Boundary Fence	T40N,R110W, section 24; T40N,R110W, sections 7,8,18,19	3 miles log & block, built in 1961
Bacon Ridge Fence	T40N,R111W, section 24	1 mile buck & pole, built in 1990
Raspberry Creek Boundary Fence	T40N,R110W, sections 4,5; T40N,R110W, section 4; T41N,R110W, sections 26,34,35	3 miles buck & pole, built in 1971
Tepee Creek Drift Fence	T39N,R110W, sections 9,16	1 mile buck & pole, built in 1983
Kendall Warm Springs Protection Fence	T38N,R110W, section 2	1.5 miles barbed-wire and buck & pole, built in 1972
Kendall Administrative Site Fence	T38N,R110W, sections 14,23	2 miles buck & pole and barbed-wire, built in 1930
Little Sheep Mountain Boundary Fence	T39N,R109W, sections 15,22	.5 mile buck & pole, built in 1964
Green River Boundary Fence	T38N,R110W, sections 25,26	1.5 miles barbed-wire, built in 1940
Whiskey Grove Campground Fence	T38N,R110W, section 14	.3 mile buck & pole, built in 1960
Mud Lake Fence	T40N,R109W, sections 20,29, 31,32; T39N,R109W, section 6	4 miles barbed-wire let-down, built in 2003
Tosi Creek Management Fence	T39N,R110W, sections 10,15,22	2 miles buck & pole, built in 1979
Pinyon Ridge Fence	T40N,R109W, sections 17,18,20,21; T40N,R110W, section 13	3 mile barbed-wire let-down, built in 2003
Pinyon Ridge Management Fence	T40N,R109W, sections 27,28,34,35	3.5 miles buck & pole, built in 1979
Gypsum Creek Division Fence	T39N,R109W, section 31; T39N,R110W, section 36; T38N,R110W, section 1	2.7 miles buck & pole, built in 1982
Tepee Creek Division Fence	T39N,R111W, sections 1,12	.7 mile buck & pole, built in 1982
Cow Pie #1 Waterline	T40N,R109W, sections 34,35	1.5 miles spring/line/trough, built in 1983

Description	Location	Comments
Tepee Ridge Water	T39N,R111W, section 13	Development troughs, built in 1984
Mosquito Lake Cow Camp and 40-acre Horse Pasture	T40N,R110W, section 22	1 cabin, built in 1964
Strawberry Creek Cow Camp and 40-acre Horse Pasture	T41N,R110W, section 36	1 cabin, built in 1975
Rock Creek Cow Camp	T38N,R110W, section 26	1 cabin, built in 1977
Gypsum Creek Cow Camp and 40-acre Horse Pasture	T39N,R109W, section 32	1 cabin, built in 1977
Marsh Creek Stock Bridge	T37N,R109W, section 30	1 bridge, built in 1946
Gypsum Creek Stock Bridges	T38N,R109W, sections 31,32	2 bridges, built in 1981
Pot Creek Stock Bridge	T37N,R109W, section 18	1 bridge, built in 1948
Boulder Creek Stock Bridge	T37N,R109W, section 19	1 bridge, built in 1948
Tosi Creek Stock Bridge-#1	T39N,R110W, section 15	1 bridge, built in 1980
Tosi Creek Stock Bridge-#2	T39N,R110W, section 17	1 bridge, built in 1980
Mosquito Lake Cattleguard	T40N,R110W, northwest part of section 9	1 cattleguard, built in 1979
Kendall Cattleguard-#1	T38N,R110W, northwest part of section 14	1 cattleguard, built in 1982
Kendall Cattleguard-#2	T38N,R110W, northeast part of section 14	1 cattleguard, built in 1982
Tepee Cattleguard	T39N,R111W, section 1	1 cattleguard, built in 1982
Noble Pastures Allotment		
Allotment Boundary Fence	T37N,R110W,769001, sections 7,8,17,18	~2.5 miles of post/wire
Allotment Interior Fence	T37N,R110W,769001, sections 19,20	~1.5 miles of post/wire
Corral	Not available	Post/wire
Wagon Creek Allotment		
Wagon Creek Boundary Fence	Not available	1.5 miles of barbed-wire
Roaring Fork Allotment		
Roaring Fork/Upper Green River Fence	T39N,R109W,713008 sections 2,10,11,15	~3 miles of 3-wire, 1 mile of buck & pole, maintenance shared with Upper Green River Allotment
Gunsight Pass Fence	T40N,R109W, section 36 T39N,R108W, section 6	~2 miles of buck & pole, and .5 mile 3-wire with top rail
Roaring Fork Allotment Boundary Fence	T39N,R108W,709002 section 30	~.75 mile buck & pole, .25 mile 3-wire, adjacent to the Green River Administrative Site
Roaring Fork Stock Bridge	T39N,R109W, section 11	Treated timber with concrete foundation, permittee maintains deck and side rails only
Beaver-Twin Allotment		
Beaver-Twin/Badger Creek Allotment Boundary Fence	T37N,R111W, sections 1,12 T38N,R111W, section 36	~2 miles of 3-wire, let down
Rock Creek Fence	T38N,R110W, sections 18,19	~.25 mile 3-wire with top pole

Description	Location	Comments
Badger Creek Allotment		
Beaver-Twin/Badger Creek Allotment Boundary Fence	T37N,R111W, sections 1,12 T38N,R111W, section 36	~2 miles of 3-wire, let down

Nonstructural range improvements that were accomplished in the area include a 1,240-acre sagebrush-spraying project in Lower Teepee Creek Basin in 1956. In addition, 8,890 acres of sagebrush were sprayed in the Mosquito Lake area in 1957. During the latter project, wind drift of the herbicide apparently caused aspen and willow mortality near the project site.

HERITAGE RESOURCES

The following discussion and analysis are based on the Heritage Resources Report for the Upper Green River Area Rangeland Project Decision prepared for the Wyoming State Historic Preservation Office (SHPO) on October 4, 2002. Applicable direction is also contained in Chapter 4 of the Forest Plan (p.142).

Desired Future Condition

Cultural resources will be protected and, where possible, made accessible to the public through interpretive and other programs.

Existing Condition

Heritage Resources include prehistoric sites, historic sites and traditional cultural properties. These sites are collectively known as historic properties. The National Historic Preservation Act (NHPA), as amended, mandates the Forest Service to take into account the effects management actions will have on historic properties. In 1995 the BTNF entered into a Memorandum of Understanding with SHPO for Rangeland Management Activities that established a process by which historic properties would be considered in accordance with the intent of Section 106 and Section 110 of NHPA. This process calls for a Class I overview of existing information on each allotment. This is followed by a Class III inventory in areas expected to have a high density of heritage resources and areas receiving severe impacts due to livestock grazing. If historic properties are identified and indicate physical damage from rangeland activities, the Forest Service shall consult with the Wyoming SHPO in applying Criteria of Effects and Adverse Effect pursuant to 36 CFR 800.5 and appropriate treatment will be determined and scheduled for implementation. Appropriate treatments may include avoidance, mitigation, or other actions such as fencing.

To date, there have been a total of 3,501 acres within the allotment complex that have been intensely surveyed for heritage resources. A total of 68 sites have been identified as a result of these surveys. Of the 68 recorded sites, 50 are prehistoric sites, 17 area historic sites, and one has both a prehistoric and historic component. Of the 68 recorded sites, 10 have been determined to be eligible for the National Register, 31 have been determined to be not eligible, and 27 remain unevaluated. There are no identified natural features or landmarks and there are no sites listed on the National Register of Historic Places.

Early American Indian Habitation: Over time, human uses have cumulatively affected physical resources and social values throughout the project area. American Indians relied on the natural resources in the region for centuries before Euro-Americans came to the Upper Green River Valley. Archeological evidence recovered from the project area indicates that prehistoric people inhabited the region for much of the last 10,000 years. The Upper Green River is a transition zone between the Green river Basin and the mountainous regions of the Wind River and Gros Ventre Mountain ranges. Prehistoric hunters and gatherers would pass through the Upper Green River Valley following the seasonal movement of big game and availability of plant resources. Prehistoric sites are generally identified by scatters of chipped stone tools, flaking debris, ground stone implements, and projectile points. Sites may also contain buried fire pits or other culturally modified artifacts. These sites are classified into three broad categories that include plant processing locations, animal kill and or butchering locations, or short term residential campsites where a wide range of domestic activities took place. The information contained in these sites can provide valuable clues concerning season of occupation, the types of resources being exploited, and possible trade and travel networks to surrounding areas.

By the time European explorers and trappers arrived, this area was home to the Shoshone Indian Tribe, and a sub-band of the Shoshone known as the Sheepeater Indians. Other tribes known to frequent the area include the Bannock, Crow and Blackfoot.

Historic Period Habitation: By the early 1800s, Euro-American explorers and trappers had made their way into the project area. Some historians point to John Colter as the first of the mountain men to visit the Upper Green River country in 1807, and others were soon to follow. In 1811, Wilson Hunt crossed the Continental Divide at Union Pass, and descended Wagon Creek into the Upper Green River Valley. Hunt was bound for the mouth of the Columbia River on the west coast with the intent of establishing a trading headquarters for the American Fur Company. The Upper Green River became well known as prime beaver trapping country, and over the next 20 years, fur trapping on the Green river and its tributaries became intense. By 1840 demand for beaver pelts declined, and coupled with the decimation of the beaver population, the trapping industry ended in the Green River country.

The next major influx into the Upper Green came in 1867. With the arrival of the transcontinental railroad in southern Wyoming, the demand for railroad ties was great. The vast timber resources along the Upper Green provided an ideal source for these ties. Charles Delony was contracted to provide these ties, and in 1867 set up a cook shack, commissary, bunkhouse, and saw mill on the banks of the Green River near the present day Forest boundary. Delony continued to cut and haul ties from this area until 1870 when his contract with the railroad was met. The tie hack operations came to brief halt but began again in 1895 with the creation of the Green River Lumber and Tie Company. The headquarters for this operation were located at what is now the Kendall Guard Station. Tie hack operations were to continue along the Green and its tributaries until 1904. The remains of many of these early tie hack cabins can still be seen throughout the project area.

The late 1800s and early 1900s also saw limited gold mine exploration, primarily along Miner Creek, Tosi Creek, Twin Creek, and other tributaries of the Green. These operations

never produced significant quantities of gold. Gold mining activities along Miner Creek continued as late as 1980.

Early homesteaders and "dude ranchers" made their way into the project area during the late 1800s and early 1900s. Livestock grazing probably began using the area between 1885 and 1890. In 1916 the Upper Green River Cattle and Horse Growers Association formed to make efficient use of the grazeable acres of Forest land in the valley. The association began with 20 members who pooled their 11,377 head of cattle. Cattle grazing became an important tradition in the project area, and this tradition continues today.

Some of the early ranchers supplemented their incomes by running trap lines or guiding hunters on big game hunts. The Billy Wells Dude Ranch (also known as the Gros Ventre Lodge), was established in 1897 approximately five miles north of the Forest Boundary, and was one of the first dude ranches to be established in Wyoming. The remains of this dude ranch can still be seen on the terrace above the Green River.

Federal Government influence in the project area began in 1902 with the creation of the Yellowstone Forest Reserve. This newly created reserve was divided into four divisions including the Wind River Division that included all of the project area. The headquarters for this division was established at Kendall and the Kendall Guard Station remained in this status until 1909 when the headquarters were moved to Pinedale. 1909 was also the first winter of feeding elk along the Upper Green at the Big Bend. A baited trail of hay was laid every ten feet to encourage elk to come down from Green River Lakes and stay along the Upper Green instead of migrating onto ranchlands in the Green River Basin. The herd at that time numbered around 1,000. During the 1940s, a permanent feed ground was established at the same location for approximately 600 head of elk.

In 1933, the Civilian Conservation Corps (CCC) set up a large camp at the Big Bend of the Green River and was responsible for construction of roads and fences as well as the Lower Green River Lakes Campground. The CCCs also conducted stream improvements on Rock Creek and Tosi Creek to try and alleviate problems caused by floating ties during the tie hack era.

RECREATION, TRANSPORTATION, VISUAL RESOURCES, WILDERNESS

Desired Future Condition

Maintain the existing range of recreation settings and experiences, and improve existing settings to better meet public expectations.

Existing Conditions Related to Livestock Grazing within Project Area.

Introduction

The project area includes a mix of recreation settings from highly developed, Roaded to

Primitive and Semi-primitive settings. A variety of recreation activities occur within the six allotments during the summer, fall and winter months. Summer/fall activities include: camping, fishing, horseback riding and packing, day-hiking and backpacking, big game hunting, scenic driving, rafting, ATV and 4-wheel drive activities, mountain bicycling, and firewood gathering. Winter activities include snowmobiling, cross-country skiing, dog sledding, and Christmas tree cutting.

The Upper Green River area contributes greatly to the Bridger-Teton National Forest's recognition as a nationally significant recreation forest. The Upper Green's rich cultural heritage and outstanding opportunities for camping, hunting, fishing, and unlimited opportunities for wildlife viewing make this area popular to Forest visitors, particularly from June through November, with peak campground and Wilderness use occurring from July through early September and peak dispersed recreation use occurring during the fall big game hunting season (September through October).

Developed & Dispersed Recreation/Administrative Sites. Two Developed Recreation sites and two Administrative Sites lie within or adjacent to the project area:

- The highly developed Green River Lakes Campground and Trailhead to the Bridger Wilderness are located adjacent to the eastern boundary of the Roaring Fork Allotment. This campground contains 39 family campsites and 3 large group campsites. Occupancy of this campground peaks in July and August, with an average occupancy rate of 78%. The Green River Lakes Trailhead accommodates up to 120 vehicles during the peak season of July and August. This site also contains a Forest Service Administrative Site. The Green River Lakes Campground/Trailhead/Administrative Site is fenced along the Upper Green and Roaring Fork Allotment boundaries.

- The Whiskey Grove Campground, located within the Upper Green Allotment, contains 9 campsites and remains about 50% full during its peak season of July through early September. This campground is fully fenced to exclude cattle.

- The Kendall Guard Station and associated administrative pasture is located within the Upper Green Allotment. The guard station and associated buildings are fully fenced to exclude cattle. The administrative pasture fence was removed several years ago and is scheduled to be reconstructed when funds become available.

Popular dispersed recreation attractions within the project area include the entire Green River corridor, Dollar Lake, Water Dog Lake, Mosquito Lake, and the Continental Divide National Scenic Trail (CDNST). The Green River corridor along Forest Road #650 is a primary destination area from June through October. Fifty-six established dispersed campsites have been mapped in the upper Green River corridor; over one hundred others are found elsewhere throughout the project area. Use of dispersed campsites within the project area is greatest during the fall big game hunting season, in September and October. There is some conflict between dispersed camping and livestock in areas of high recreation use when cattle are present in or near popular campsites and along streams and rivers.

Livestock use of the south side of the Upper Green River on the Roaring Fork Allotment has been light in past years.

The potential exists for conflicts between motorists and cattle from cattle congregating along the Union Pass Road (FS Rd #600) and Green River Lakes Road (FS Rd #650), especially at the Upper Green River Forest Boundary entrance, Kendall Bridge, and Fish Creek Bridge (Driveway, Upper Green Allotment, Roaring Fork Allotment).

Illegal motorized vehicle travel (4x4 pickups, jeeps, ATV's), in violation of travel plan restrictions and wilderness designation, is common within the project area, particularly during the fall big game hunting season. To help prevent additional illegal use of closed roads by visitors, authorization for permittees to utilize motorized vehicles on roads closed to the public should be limited within the project area.

Cattle and recreational stock are possibly impacting streambanks and trails, causing sedimentation at several stream crossings within the project area.

Visual quality within the project area has been impacted by cattle in several areas due to trampled vegetation/bare sites, trampled stream banks, and high concentrations of cattle at critical view sites. This is most prevalent within riparian zones.

Range structural improvements (fences, corrals, pipelines, troughs, cabins, etc.), disrupt cross-country travel, impact visual quality, and/or pose safety concerns for visitors when not properly maintained. Conflicts regarding available forage for livestock and recreational stock are occurring at Water Dog Lakes (Beaver-Twin Allotment).Salting sites encourage concentration of livestock, causing visual impacts where vegetation is trampled and soil is compacted. Particular concern was expressed regarding the Gypsum Creek area.

The Upper Green River has been determined eligible for Wild & Scenic designation.

Within the Bridger Wilderness portion of the Roaring Fork Allotment, Trail #7146 is heavily eroded from the Wilderness boundary to Alexander Park. Placing livestock in this area could cause further erosion of Trail #7146.

Transportation (Roads/Trails)

Roads

The primary roads accessing the project area are the Union Pass Road #600, Green River Lakes Road #650, and Moose-Gypsum Road #680. Numerous secondary and tertiary Forest System roads branch from these three main arteries. In 1996, the Pinedale District implemented a Travel Management Plan, which identified all Forest System Roads that are open for motorized travel. The 1996 Pinedale District Travel Plan Map was updated in 1998 and identifies all current roads that are open to motorized vehicle travel on the district. As part of the 1996 Travel Plan Decision, approximately 130 miles of user-created routes within the project area were identified as needing to be closed or "decommissioned". Approximately 50 miles of user-created routes have been physically closed within the project area within the past eight years.

Many of the tertiary roads within the project area were created by users over many years. These usually lack surfacing and often wind through rocks and wet areas, leading to multiple/rutted roads, erosion of roadway tread, and sedimentation to streams.

Road projects that are scheduled within the foreseeable future in this project area:

1. Travel Plan implementation & enforcement: An estimated 80 miles of road within the project area still need be closed. Signing and enforcement of Travel Plan restrictions are a continuing effort.

2. The Green River Lakes Road (#650) is scheduled for reconstruction as funding allows (possibly as early as 2005), including gravel surfacing and widening to a two-lane standard.

Unauthorized recreational vehicle use off open Forest System Roads is a common problem throughout the project area, particularly during hunting season. Illegal use of motor vehicles appears to be strongly influenced by visitors seeing recent vehicle or OHV tracks off of an open route, which encourages others to utilize the same routes. In addition, conflict is created when one member or segment of the public is authorized to utilize motorized vehicles on closed routes when others are not authorized. To help prevent additional conflicts and use of these closed routes and areas by unauthorized Forest visitors, authorization for permittees to utilize motorized vehicles on roads closed to the public are limited to only those absolutely necessary for management of livestock. As fencing within the project area is scheduled for construction or replacement, fences and gates should be designed to help minimize illegal ATV use on closed routes, particularly in documented problem areas.

The potential exists for conflicts between motorists and cattle from cattle congregating along the Union Pass Road (FS Rd #600) and Green River Lakes Road (FS Rd #650), especially at the Upper Green River Forest Boundary entrance, Kendall Bridge, and Fish Creek Bridge. Cattle drives along the Green River Lakes Road do not appear to be causing safety hazards or conflicts between Forest visitors and permittees. However, the cattle driveway is visually impacted, particularly at the Forest boundary, which impacts the overall scenic quality of this road.

Trails

There are approximately 35 total miles of Forest System Trails utilized by Forest visitor within the project area as follows:

Table 3-27
Forest System Trails within Project area.

Trail Name	Trail Number	Trail Miles	Allotment Name
Continental Divide National Scenic Trail	#7095	5 miles	Roaring Fork
Roaring Fork Trail	#7146	1.5 miles	Roaring Fork
Tosi Creek Trail	#7152	6 miles	Upper Green
Beaver-Twin/Rock Creek Trail	#7153	19 miles	Beaver-Twin
Sawmill Meadows Trail	#7154	6 miles	Beaver-Twin & Badger

During the summer months, recreation use of these trails is generally moderate and off-trail use is light. During the fall big game hunting season, recreation use is moderate to heavy on and off trail throughout the project area. Livestock impacts to Forest System Trails within the project area primarily concern stream crossings and problems with fence and gate design or location. Forest visitors occasionally leave gates open, particularly when gates are not designed to be visitor-friendly. Fence corners lacking gates are occasionally cut by visitors traveling cross-country with horses. The fence along the eastern boundary of the Roaring Fork Allotment, which crosses the Continental Divide National Scenic Trail, was recently reconstructed and is an excellent example of a visually appealing and user-friendly design, with a gate that can easily be opened and closed from foot or horseback. Since this fence was reconstructed, complaints of Roaring Fork Allotment cattle entering the Green River Campground and Upper Green River Lake area inside the Bridger Wilderness have been significantly reduced.

Conflict between recreation use and cattle movement along trails is less a problem than within dispersed sites where people camp.

Outfitter-guides

Within the project area, summer and fall outfitted trips primarily occur within the Bridger Wilderness, Gros Ventre Wilderness, entire Green River corridor, Water Dog Lakes area, Big Twin Creek area, Dodge Butte area, and Rock Creek area.

To date, specific conflicts between livestock grazing and outfitter-guide use have primarily been limited to the Water Dog Lake area of the Beaver-Twin Allotment, where recreational stock and cattle are competing for limited forage.

Following is a brief description of summer/fall outfitter guide operations authorized within the project area:

- Summer outfitter-guide use (June-August) within ¼ mile of the Green River corridor from the Forest boundary north to the Lower Green River Lake is limited to the following 6 outfitters: Thompson Outfitters, Bridger-Wilderness Outfitters, Green River Guest Ranch, Green River Lodge (aka Elkridge Lodge), Skinner Brothers, and Box R Ranch. In addition, the New Fork Boy Scout Organizational Camp is authorized guided trips along this corridor. Guided activities along the Green River include fishing, rafting, canoeing, horseback riding, and dispersed camping.

- Summer outfitter-guide use (July-August) of the Bridger Wilderness portion of the project area is authorized for 19 outfitters.

- Summer outfitter-guide use (July-August) of the Gros Ventre Wilderness portion of the project area is authorized for the following 3 outfitters: Darwin Ranch, Bridger-Wilderness Outfitters, and Black Diamond Outfitters.

- Summer outfitter-guide use (June-August) within the Waterdog Lakes area is limited to Flying A Ranch, Green River Outfitters, Bridger Wilderness Outfitters, and Green River Lodge.

- Fall outfitter-guide use (August-November) within the project area is authorized for the following 5 outfitters: Thomson Outfitters, Bridger-Wilderness Outfitters, Black Diamond Outfitters, Green River Outfitters, and Elk Ridge Outfitters. Approximately five spike camps for sheep hunting are periodically authorized within the project area.

- There are two Outfitter Guide Assigned Sites located within the project area as follows: Thomson Outfitters has one Assigned Site located within the Roaring Fork Allotment where summer and fall use is authorized. Bridger Wilderness Outfitters has one Assigned Site located on Bartlette Creek, where fall use is authorized.

Wild and Scenic Rivers

The Green River, from its source to the Forest boundary, has been nominated and found eligible for consideration as a Wild and Scenic River. Upstream from the Lower Green River Lake (inside the Bridger Wilderness), the Green River is eligible as a potential Wild River. From the Lower Green River Lake downstream to the Forest boundary (25.5 miles) it is eligible as a Scenic River. Two major tributaries within the project area are also eligible as Wild Rivers: Tosi Creek and Roaring Fork Creek.

There are no provisions in the Wild and Scenic Rivers Act that would restrict livestock operations beyond meeting general Forest Plan standards for riparian condition and utilization. In a Scenic River corridor, traditional pasture and irrigated land would continue to be managed for that use. Currently, there are several areas where vegetative condition or streambank erosion caused by grazing and recreational use are impacting the Scenic quality of the Green River, including the Forest Boundary/parking area, Kendall Bridge, and Upper Green Feedground.

Visual Quality

Visual quality objectives are defined in the Forest Plan and serve as a classification system used to set objectives for facility planning and resource management. Most of the upper Green River and surrounding area is exceptionally scenic and wild, and intrusions on the natural landscape are minor and few. The road system, areas of past timber harvest, and a few structures are the primary human-induced changes; some of these are inconsistent with scenic management objectives and future management will be directed toward improving conditions at these locations. Areas within the project area where livestock grazing and associated practices have, or could in the future, affect scenic quality are listed below.

Table 3-28
Visual Quality Objective Concerns Within Project Area.

Location	Visual Quality Objective	Existing Condition
South Fork Gypsum Creek	Preservation	Historic saltground placed near trail, resulting in bare area.
Roaring Fork Area	Preservation	Erosion and multiple trails already exist with potential for more problems if cattle move up Roaring Fork Trail into Bridger Wilderness.
Green River Corridor	Retention	Spot locations of compacted soil, trampled vegetation, multiple access routes, and erosion of streambanks, at Upper Green River Forest Boundary and Kendall bridge.
Tepee Creek Ridge Area	Preservation	Soil compaction, erosion, and trampled vegetation inside Gros Ventre Wilderness.
Mosquito Lake	Retention	Compacted soils, multiple access routes, trampled vegetation, and erosion.
Water Dog Lake	Partial Retention Modification, & Preservation	Soil compaction, trampled vegetation, erosion, and closed roads.

- **Preservation (P):** This VQO allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.
- **Retention (R):** This VQO dictates that management activities are not evident to the average viewer. Much of the project area falls under this category for scenery management.
- **Partial Retention (PR):** This objective allows management activities to be visible, but subordinate to the characteristic landscape.
- **Modification (M):** Under this VQO, management activities may visually dominate the original characteristic landscape. However, management activities and introductions to the natural setting must be designed to blend with the landscape by using lines, forms, colors, and textures found in the surrounding natural landscape. These areas are typically where landscapes are not highly visible.

Recreation Opportunity Spectrum (ROS) by DFC.

The ROS classification system provides a framework for stratifying and defining classes of outdoor recreation opportunity environments. This system is primarily used for facility planning and to direct management practices. The ROS is designed to respond to local, regional, and national recreation demand while protecting natural resources and special characteristics and features within the recreational setting.

The following summarizes the ROS classes for each of the DFC areas within the project area:

- DFC 3: Semi-primitive/Non motorized, Semi–primitive/Motorized, Roaded Natural
- DFC 6A: Pristine
- DFC 6B: Primitive
- DFC 9A: Roaded Natural
- DFC 10: Semi-primitive/Non motorized, semi–primitive/Motorized, Roaded Natural
- DFC 12: Semi–primitive/Motorized, Roaded Natural

Pristine: In pristine areas, there should be no perceptible evidence of human use. Management emphasis for this area is to protect and perpetuate pristine biophysical conditions. Motorized use is not permitted. A small portion of the Upper Green Allotment inside the Bridger Wilderness lies within this category.

Primitive: These areas are characterized by essentially unmodified natural environments of fairly large size. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use is not permitted. Primitive areas within the project area occur inside the Bridger and Gros Ventre wildernesses and the area north of the Green River Lakes (Roaring Fork, Upper Green, and Beaver-Twin Allotments).

Semi-primitive, Non-Motorized: These areas are characterized by a predominantly natural-appearing environment of a moderate-to-large size. The area is managed to minimize on-site controls and restrictions, which may be present but are subtle. Motorized use is not permitted. Within the project area, these areas include the Water Dog Lakes area of the Beaver-Twin Allotment and a small portion south of Green River Lakes in the Upper Green Allotment.

Semi-Primitive, Motorized: These areas are characterized the same as semi-primitive, non-motorized areas, except that motorized use is permitted. Within the project area, these areas include portions of the Upper Green Allotment along the Gros Ventre Wilderness boundary and the Pinyon Ridge area of the Roaring Fork Allotment.

Roaded, Natural: These areas are characterized by a predominantly natural-appearing environment with moderate evidence of human presence. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities. The majority of the project area outside of wilderness falls within this category.

WILDERNESS

Section 4 (d) (4) (2) of the 1964 Wilderness Act (P.L. 88-577), states: "the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture." The 1964 Wilderness Act further mandates that Wilderness be managed so its community of life is untrammeled by man, its primeval character is retained, and its natural conditions are preserved. Forest Service policy direction is to maintain Wilderness in such a manner that ecological systems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.

Portions of the Roaring Fork Allotment lie with DFC 6B (Wilderness-Primitive) of the Bridger Wilderness, north of the Lower Green River Lake. Portions of the Upper Green Allotment lie within DFC 6A (Wilderness-Pristine) and DFC 6B of the Bridger Wilderness. Portions of the Beaver-Twin Allotment and Upper Green Allotment lie within DFC 6B of the Gros Ventre Wilderness. The Bridger Wilderness was designated by Congress through the 1964 Wilderness Act. The Gros Ventre Wilderness was designated by Congress through the 1984 Wyoming Wilderness Act.

Forest Plan direction for DFC 6A and DFC 6B :

- Within DFC 6A: Livestock grazing is <u>not</u> permitted. Pack and saddle stock grazing is permitted.
- Within DFC 6B: Livestock grazing <u>is</u> permitted. Range is managed to maintain and enhance range and watershed condition while providing forage for livestock and wildlife.

DFC 6A: The DFC 6A portion of the Upper Green Allotment within the Bridger Wilderness conflicts with Forest Plan direction. This issue was identified and documented in the 1995 Bridger Wilderness Action Plan. This allotment was created well before the 1964 Wilderness Act, and this discrepancy appears to be a Forest Plan mapping error rather than an attempt to purposely exclude cattle from this area. Congressional Grazing Guidelines prohibit removal of livestock grazing within Wilderness simply because it occurs in Wilderness. This correction has been completed.

DFC 6B: Forest Plan grazing management direction for DFC 6B is as follows: Grazing is managed to maintain and enhance existing range and watershed conditions while providing forage for cattle, sheep, recreational stock, and wildlife. A natural mosaic of different ecological stages exists due to natural processes and livestock grazing. Grazing management activities ensure that livestock use remains within grazing capacity. Domestic livestock distribution is achieved through riding, herding, and salting. Improvements are maintained and built only to the extent needed to cost-effectively maintain stewardship of the range.

Wildlife movement is not impeded by range structures and no wildlife displacement occurs in crucial areas. Visitors understand why grazing is permitted and know when and where they are likely to encounter domestic cattle or sheep.

Facilities determined necessary for resource protection or those facilities constructed prior to wilderness designation are permitted within wilderness. Such facilities should be routinely evaluated to determine their effectiveness and monitored to ensure that they are properly maintained. When facilities are determined no longer necessary, they should be removed from wilderness immediately.

Bridger Wilderness

The Bridger is a popular destination wilderness, with 75-80% of its annual use originating from out-of-state and 3% from out of country. Visitor use within the Bridger Wilderness is high between July and August, moderate from September to October, and low throughout the remainder of the year. The Green River Trailhead, which routinely ranks third highest-used trailhead to access the Bridger Wilderness, accounts for approximately 20% of the total visitor use entering the Bridger Wilderness annually.

Existing conditions within the Bridger Wilderness related to livestock grazing:

1. Within the Bridger Wilderness portion of the Roaring Fork Allotment, Trail #7146 is heavily eroded from the Wilderness boundary to Alexander Park. Placing livestock in this area could cause further erosion of Trail #7146.

2. The South Gypsum and Jim Creek trails, located within the Bridger Wilderness, have been officially abandoned to allow for more challenging, trail-less opportunities within this portion of the wilderness. This action was taken primarily because these trails access areas designated as DFC 6A, (Wilderness-Pristine), which is identified as trail-less in the Forest Plan. The trailheads for these two trails have been abandoned and removed from the Pinedale District Travel Plan map to help meet recreation management objectives for this area. Permittees are authorized to utilize both of these trails to distribute cattle, drop off salt, etc., but the portions they utilize are located well outside of the DFC 6A areas. Although these trails are officially abandoned, occasional clearing of trees by the permittees is authorized on these portions of the two trails to keep them open for livestock distribution. This does not appear to be conflicting with the overall recreation management objectives for this area.

Gros Ventre Wilderness

Of the three wilderness areas located on the Forest, the Gros Ventre Wilderness retains the highest degree of primitive character and challenge, primarily due to light visitor use and limited historic human influence. The majority of the use within the Gros Ventre Wilderness originates from within state, and peak use occurs during the fall big game hunting season.